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Contents

PAGE

Editorials:
The Copper Statistics for January.... 353
The Giroux Report..... 353
The Massachusetts Institute of Technology 354
The Joplin Zinc Ore Contracts..... 354
Correspondence and Discussion:
Clancy Process of Ore Treatment ....The Metallurgy of Manganese .... Seeking Employment .... Ignition of Sulphide Ores....The Transvaal Stope Drill Competition .... Huff Electrostatic Process..... 355
Organizing the New York Curb Market.. 358
Guanajuato Reduction and Mines Co.... 358
Details of Practical Mining:
*Shoring Up a Crane Runway.... Freezing of Compressed Air Pipe Lines .... *Oiling Tramway Track Cables....A Substitute for Platinum Triangles....*Determining the Face of Winding Drums ....*An Improved Zinc-Dust Feeder....Device for Oscillating Laboratory Balances ....Underground Electric Hoists on the Rand..... 359
Guggenheim Exploration Company..... 363
The American Institute of Mining Engineers 363
John C. F. Randolph..... 363
The Calumet & Hecla Consolidation..... 363
New York Curb Market in 1910..... 364
*Transport Conditions in Bolivia.
George W. Dean 365
Largest Gyratory Breaker in the World.. 367
Improved Lap-Welded Pipe..... 367
*Cyanide Treatment of Concentrates.
A. B. Parsons 368
The Ingersoll Drill and Cameron Pump Historically Considered.
W. L. Saunders 370
Texas Mining Laws and Prospecting.
Martin Fishback 371
*The Humphrey System of Pumping.... 373
The Pozos Camp, Guanajuato, Mexico.
Herbert A. Megraw 374
Nomenclature of Iron and Steel.—II.
Henry M. Howe 375
Western Coal Rates..... 379
Certificated Coal Miners..... 379
Evidence in Favor of Wetting a Mine... 379
Marianna—Corrections 379
*Model Coal Mine at Marianna.
A. C. Beeson and Floyd W. Parsons 380
New Publications..... 384
Personal, Obituary and Societies..... 385
Editorial Correspondence..... 386
Mining News..... 388
Markets 394
Illustrated.

The Engineering and Mining Journal

FEBRUARY 18, 1911.

The Copper Statistics for January

The January report of the Copper Producers' Association was about what everyone expected, and it had but little effect upon the market. It is an encouraging sign that the public is, perhaps, ceasing to draw too far-reaching deductions from these figures. The relatively low refinery production in January is, of course, satisfactory, although it may be premature to say that the curtailment of the smelters is now becoming manifest. Probably the refiners were doing some cleaning up toward the end of the year, but, anyway, it is possible to have a material curtailment in the smeltery output and a maintenance of the refinery output because of the larger supplies of foreign material brought hither for refining. Even in the face of a large increase in the production of our refineries in 1910, amounting to upward of 40,000,000 lb., the world's production of copper increased by only about 20,000,000 lb. It is the statistics of the world's production and consumption that tell the story, not the figures for any single country.

The smallness of the deliveries in January was significant of nothing beyond the probability that buyers were awaiting an opportune time to replenish their supplies and in the meanwhile were using up what they already had on hand. Nobody believes, of course, that the deliveries in January measured such a recession in consumption. The confidence of the buyers of copper was greatly upset by the bad handling of the market on the part of the sellers during January. Buyers know very well that copper at present prices is cheap, but they are not going to take it in if they feel sure they can obtain it more cheaply later on. However, real consumptive requirements must, sooner or later, be provided for.

In the meanwhile, the dreaded increase in copper production in 1911 seems to be very slow in materializing. Neither the Miami nor the Ray Consolidated has yet turned out a pound of copper in concentrates, and it seems to be likely that they will fail to do so before March. Their ore is to be sent away from the mines for smelting and, consequently, it is likely to be a matter of three or four months after their first shipment before the refined copper will be ready for delivery.

The Giroux Report

Messrs. Cole and Ryan are now completely committed to the policy of publicity. Their progress in this direction has been rather peculiar. Among their companies, Cananea has always been distinguished for the fullness of its reports, which have communicated all that any stockholder could reasonably ask. But, while Cananea was so frank, the affairs of North Butte were shrouded in secrecy until the surprising revelations that the mine was practically bottomed were made. Since then, the developments of North Butte have been reported quite fully, but the veil of mystery still hung over Giroux. This veil has now been lifted by the publication of an official report.

The showing of this report is a sorry one. Briefly, the property is said to contain a development of 9,620,000 tons of ore averaging 1.36 per cent. copper, 40c. per ton in gold, and 20c. per ton in silver. This estimate does not include anything in the Alpha mine. According to Mr. Cole, the explorations so far made in that mine "are not sufficient to enable us at this time to make any estimate of definite tonnage in that territory, but such work gives every indication of a very large tonnage of high-grade ores."

Analyzing the tonnage estimate, it appears that in the Old Glory mine there is 120,000 tons of smelting ore averaging 3½ per cent. copper; in the same mine there is 650,000 tons of concentrating ore averaging 1.61 per cent. The Morris-Bunker Hill porphyry orebody is estimated at 4,650,000 tons, averaging 1½ per cent. copper, while in the terri-

tory just north of the Butte & Ely property drilling has developed 4,200,000 tons averaging 1.11 per cent. copper. There is, consequently, 9,500,000 tons of disseminated ore averaging 1.33 per cent. copper, but only 5,300,000 tons of the grade of 1.5 per cent. and upward. Mr. Cole says that the porphyry ore, near the surface, has shown the richer copper content, and that the ore first to be extracted will average 2 per cent. in copper. However, the figures given indicate that there cannot be very much ore of that grade. Thus, assuming that the Morris-Bunker Hill orebody has 2,500,000 tons assaying 2 per cent. copper, the remainder of that orebody must consist of material poorer than 1.1 per cent.

Besides its copper content the Giroux ore contains about 60c. worth of gold and silver per ton. It is not frank of the management to reckon this at face value, to-wit $5,772,000. With an ore of approximately the same precious metal content, the Nevada Consolidated obtains a little less than 50 per cent. thereof. It is unreasonable to estimate more than 30c. per ton for the Giroux ore on this account. This may be taken as the equivalent of 2½ lb. of copper. Even with this addition the average grade of the porphyry ore is only 1.45 per cent. Under the conditions existing in this mine the direct-operating expense for copper from that grade of ore would probably be 14@15c. per lb. Out of the limited quantity of 2 per cent. ore copper could hardly be obtained at less than 11c. per lb. The value of these disseminated orebodies, in our opinion, is but small.

As to the Alpha mine some high-grade ore has been found at the 1000-ft. and 1200-ft. levels, its downward and lateral extent being as yet unknown. In this mine there is a great zone of leaching and the possibility that copper therefrom may have been redeposited at depth, but nothing very definite is yet known about that and the mine at present is to be regarded only as a prospect. Mr. Cole is entirely optimistic, but conservative people will await developments before building great hopes.

The disclosures about Giroux will be distinctly disappointing to a great many of its stockholders who have heretofore been in the dark. This has been a great pity, because under the glamour of mystery the stock, not very long ago, was run up to $12 per share, for which there was no justification whatever. Mystery about a mine usually means that there is something that would not sound well in telling.

The Massachusetts Institute of Technology

The appeal of the Massachusetts Institute of Technology for a State grant of $100,000 a year for 10 years has disclosed a situation in engineering education that is of much more than local importance. It is natural for Technology graduates to feel that all the arguments in the case are on their side. But even from a broader point of view than that of the alumnus, the Institute's appeal deserves not only sympathy but active support. The whole engineering profession, and the general public as well, have vital interests at stake in the welfare of our best technical schools, among which "Tech" is admittedly one of the foremost, and one of the most famous.

For Massachusetts in particular, it would seem that the mere money prudence of helping the Institute through its impending transfer to a new site should be so apparent as to make serious opposition impossible. Massachusetts is an industrial State, and her prosperity depends utterly on the skilful technical conduct of her industries. Higher efficiency in existing processes, the invention of still better processes, and new ways of utilizing waste products, are a few of the conditions that Massachusetts industries must meet if they are to withstand future competition. These are the conditions that Technology men are trained to deal with, and have successfully dealt with in the past. They are conditions that demand a constantly higher grade of training, and Technology has continually raised the pitch to keep her graduates in harmony with the actual progressive conditions of the working, practical world. The Institute is paying the penalty of well deserved success in training engineers. The number of her students has increased more rapidly than her funded endowments, and she now turns to the State which benefits most largely from her work.

President Lowell, of Harvard, who is also a life member of the Institute corporation, put the case before the Legislature committee at the recent hearing, in a fashion that will appeal to everyone. The profession of engineering, he said, is a comparatively new one. The graduates of Technology have done much for the support of their institution; but the Institute itself, though among the oldest engineering schools of the country, is still so new that its alumni have not yet had time to earn fortunes from which they can give enough to assure her support. In this case, with high standards to maintain, the Institute asks the State to stop the gap for a few years, while the alumni shoulder the burden of establishing the institution in new buildings, on a new and adequate site.

It would seem that this situation ought to bring but one answer from the State, viz., prompt and sufficient money aid. The case is typical of engineering education the country over. The western States have to pay the whole cost of their engineering schools. Massachusetts is more fortunate than she perhaps realizes, in having a school of the rank of Technology, which asks what is comparatively so little.

The Joplin Zinc Ore Contracts

It does not seem likely that the recently negotiated sliding-scale contracts in the Joplin district will be of long life. Under their terms the producers of ore have been realizing less than others selling in the open market in the old-fashioned way. Later on the market may possibly show a reverse advantage, but to begin such an arrangement at a sacrifice on his part is more than any miner can stand. However, the recent investigations by the Ore Producers' Association and the terms of the contracts negotiated under the auspices will have done some good in proving to the miners that they are not plundered by the smelters, and that in fact the ore sold in the competitive market fetches not only its full zinc value, but also its sulphur value to a considerable extent.

The new mining law now under consideration in the French Chamber of Deputies contains a clause providing that all companies or individuals obtaining mining concessions shall be bound to give the workmen they employ an interest in the production of the mines. The share of profits to be distributed to the employees is to be not less than 5 per cent.

Correspondence and Discussion

Clancy Process of Ore Treatment

In the JOURNAL of Dec. 24, 1910, there appeared an account of the most recent developments of the "Clancy Process of Ore Treatment," as presented in a paper by John Clancy at a meeting before the American Electrochemical Society, held Dec. 16, 1910, at the Chemists' Club, New York. Mr. Clancy at this meeting presented as a novel idea the application of calcium cyanamide (Ca_2CN_2) in ore treatment as a cheap potential cyanogen-bearing substitute in place of the sodium or potassium cyanides hitherto universally employed in the cyanidation of gold and silver ores.

I wish to take issue with Mr. Clancy as regards to his originality in employing calcium cyanamide in ore treatment, since I can show priority in the application of the idea to the extraction of gold and silver from ores, although Mr. Clancy may claim some novelty of doubtful value in adapting the use of calcium cyanamide to gold and silver extraction by means of electrolysis instead of the more direct method which I have proposed, viz., its transformation into calcium cyanide by subjecting the cyanamide at a red heat to acetylene, water gas or any hydrocarbon gas rich in carbon, which can be simultaneously effected during the process of manufacturing the calcium cyanamide from calcium carbide.

I cannot understand how Mr. Clancy could possibly have presented calcium cyanamide as a cheap and novel substitute of his own invention in place of the more expensive KCN or NaCN for use in the cyanide treatment of ores, when I had already described its application in U. S. Pat. 911,254, 1909.

The cyanides ordinarily used are potassium and sodium salts, KCN and NaCN. In recent years, however, there has been great development in the cheap production of cyanides of the alkaline earths, such as calcium cyanide, $Ca(CN)_2$, and barium cyanide, $Ba(CN)_2$, by means of the electric furnace, from atmospheric nitrogen. I have found that these electric-furnace products, even impure as they are, if they contain 80 to 90 per cent. of the theoretical quantity of cyanogen are available for and may be used in ammonia solutions as gold and silver solvents.

The specific claims of my patent are (1), The improvement in treating ores and tailings containing gold and silver, which consists in extracting the precious metals with a solution of ammonia and an alkaline-earth cyanide; (2), The improvement in treatment of copper, nickel, zinc and cobalt ores and tailings with some gold and silver, which consists in simultaneously extracting all the metals with a solution of ammonia and an alkaline-earth cyanide.

Views, Suggestions and Experiences of Readers

The following periodicals published articles by me and abstracts relative to the subject: *Min. and Sci. Press,* May 15, 1909; ENG. AND MIN. JOURN., April 17, 1909 (letter); *Pacific Miner,* March, 1910; *Mex. Min. Journ.,* Aug., 1910; *Chem. and Met. Engineering,* May, 1910 (abstract). In the above articles, abstract and letter, calcium cyanamide as a cheap cyanide-salt substitute produced from calcium cyanamide, thus:

$$Ca_2CN_2 + C = 2\,Ca\,(CN)_2$$

was several times noted and its use recommended as a cheap cyanogen agent for ores.

I trust I have made clear my position in this letter and convinced the cyaniding-engineering profession that Mr. Clancy is entitled to no credit in presenting calcium cyanamide, but in its intended use, as described in his last paper before the Electrochemical Society, is infringing on my rights and prerogatives in the matter.

D. MOSHER.

San Francisco, Cal., Jan. 17, 1911.

After a careful perusal of Mr. Mosher's communication, and also a careful reading of his patent specifications and other references, I fail to see any cause for discussion as to "priority" in the use of cyanamide in ore treatment. Nowhere, including his patent specifications, does it appear that he suggests the use of cyanamide *per se* as a solvent for the precious metals; on the other hand, he simply proposes, as many others before him have done, the use of calcium cyanamide as a starting point in the manufacture of calcium cyanide, by heating to a red heat calcium cyanamide with other materials in an electric furnace, and the product of this mixture, calcium cyanide, he proposes to apply to the treatment of ores.

The German chemists, Frank and Caro, many years ago attempted to produce cyanides in that way, but found that the method did not work. I am reliably informed by those actively interested in the manufacture of cyanamide that fortunes have been spent to make available the application of cyanamide in a thoroughly practical and economical way, and these persons have very generously and frankly conceded that I have solved the problem. It seems to me that it would be more to the point if Mr. Mosher took issue with Frank and Caro, for the determination of the question of "priority," for there appears to be little, if any, difference in the result finally accomplished by either of them, for they were apparently working along the same lines and the results quite naturally were the same.

The idea of my infringing any rights and prerogatives of Mr. Mosher is ridiculous. It will be apparent to anyone reading Mr. Mosher's specification that he does not use cyanamide in the cyanide solution, but proposes to use his electric-furnace product, which contains calcium cyanide of about 80 per cent. cyanogen content prepared by secondary electric-furnace treatment of cyanamide, as already described.

In the Clancy process any amide or amidine compound may be used in conjunction with the cyanide solution, such as urea, guanidine, etc. It is somewhat surprising that Mr. Mosher does not also claim priority to amide or amidine compounds in conjunction with the cyanide solution.

I trust that I have made the distinction clear in regard to the Clancy process, that it relates to the use of cyanamide in the cyanide solution and not the use of the calcium-cyanide product prepared from calcium cyanamide by special treatment, as described by Mr. Mosher.

It is abundantly clear from reading Mr. Mosher's specification that he does not attempt to claim the use of raw cyanamide in the ore-treatment process, for the simple reason that he, like many others, was not aware of the fact that a cyanamide, amide or amidine compound could be used in conjunction with the cyanide solutions until the publication of my patent specifications and the articles which I have written disclosing the same.

JOHN COLLINS CLANCY.

New York, Feb. 7, 1911.

The Metallurgy of Manganese

What literature exists about the metallurgy of manganese?

A. T.

Zacatecas, Mex., Jan. 27, 1911.

[Metallic manganese is merely a metallurgical curiosity. The important metallurgy of manganese is what pertains to the smelting for spiegeleisen and ferromanganese. Broadly speaking, that kind

of smelting is performed in a high blast furnace, similar to what is used for the production of pig iron, and the process also is similar. Brief descriptions may be found in many works on iron smelting; the transactions of the technical societies doubtless contain more specific papers upon the subject. We know of no special treatise.—EDITOR.]

Seeking Employment

The difficulty referred to by Mark R. Lamb in the JOURNAL of Oct. 22, 1910, is only too well known in Australia. In fact I imagine the mining man or engineer seeking engagement in Australia is even worse off than in America. For instance he may have spent two or three years in the Cloncurry district of North Queensland, to secure another position he must spend a week or more journeying to Sydney or Melbourne and frequently play the "waiting game" there for a few months.

It was to meet cases of this kind that the "Employment Register" was started in connection with the *Australian Mining and Engineering Review*. The work of trying to bring together the employer and the man open for engagement is done gratis. Particulars as to training, age, experience, salary required, with copies of testimonials are filed ready to forward when any application for a man to fill a vacancy is received.

Up to the present quite a number of men have been placed in positions and we feel that the service has also been of some assistance to the employers. Mr. Lamb is to be congratulated on his efforts along these lines.

PETER G. TAIT.

Melbourne, Dec. 20, 1910.

[The columns of "Positions Vacant" and "Positions Wanted" in the advertising pages of the JOURNAL constitute a ready means for seekers of places and those needing assistance to come together.—EDITOR.]

Ignition of Sulphide Ores

In the JOURNAL of Jan. 28, a desire is expressed to hear of a case of ignition of sulphide ore from blasting; this has occurred frequently at our mines, but applies only to the fine particles of pyrites dust that are in suspension in the air and the combustion does not seem in any case to extend to the larger particles. The ignition occurs most frequently in recharging holes that have failed to break properly and can be avoided by thoroughly wetting before blasting. We have had no serious acidents from this source, but I can testify from personal experience that it is exceedingly unpleasant to get trapped in the fumes, resulting from such an ignition.

P. H. HASKELL.

Mineral Point, Va., Jan. 31, 1911.

The Transvaal Stope Drill Competition

All the abstracts of the report of the committee in charge of the Transvaal stope-drill competition that I have seen to date, omit the cylinder dimensions of the machine that divided the $24,000 prize with the small 2⅛-in. Holman drill. Horsepower and duty in foot-pounds may be new terms in the vocabulary of rock-drill experts; still they are well worth consideration and I hope soon to see you present an analysis of the final figures on some such intelligible basis.

It would be rather interesting to know how the cost of 19½c. per ft. of hole drilled, credited to the winning machine, compares with machine-footage costs in the numerous mining districts of our country. It looks high even if everything is charged against it, as I believe was done in the Transvaal, that is, labor, air power, drill and column spare parts, stores, air hose, drill steels, sharpening bits, interest and depreciation on boiler and compressor plant, pipe lines, drilling-machine outfit, etc. How does 26c. per ft. for hand-drilled holes compare with hand-footage costs over here? Is it not very high?

I presume I am not the only reader who wonders how the average rock in this country compares with that on the Witwatersrand, where the greatest obstacle to "record breaking" drill stunts is the toughness of the stuff drilled in and its grittiness, which causes the bits to lose their gage in the first few inches drilled. Perhaps some of our friends who have been in South Africa will enlighten us without booming any particular drill and without taking too seriously the hardness of the rock on the properties they are now working. Let us have some real light on this subject and get away from these easy granite-block surface tests every drill agent talks about.

The Transvaal committee lays stress on the fact that the $84,000 (the cost of the contest) was well spent and that the lessons should be of incalculable value to mining men and manufacturers the world over. If that is so, what are the lessons? So far as I can see the only gem is that "maintenance cost is the deciding factor" when comparing drills. Another is, that an air pressure of over 60 lb. should be used. Nor should the weight of the machine be limited to 100 lb. when it is burdened with two to three men. But these are things we learned years ago.

We ought to know why hammer drills received that nasty little slap, indicating they did not compare with machines of the Holman and Siskol type. There are thousands in this country doing more or less satisfactory work. What were the peculiar conditions that eliminated them in the Transvaal contest? It's all very well to say who was first and who came in second, but what are the real lessons to be learned from this contest so far as it affects us over here?

WILLIAM D. GORDON.

New York, Jan. 30, 1911.

[During the last 15 years several attempts have been made on the Rand to decide the relative merits of various types of machine drills and to establish the actual cost of machine-drilled holes as compared with those drilled by hand. These determinations have been made in a series of competitive tests with suitable prizes offered the winning machines.

There are about 60 producing mines on the Rand supplying ore for about 9500 stamps. At present about a third of the world's annual gold production is derived from the Transvaal. A determination of the most efficient drill for local use therefore benefits a large number of mines operating under similar conditions and to a less degree mines in other parts of the world.

The silicified conglomerate or banket of the Rand "reefs" is more difficult to drill than the average ore encountered in the United States. Steel quickly loses its gage and the necessity of stoping over as narrow widths as possible complicates the problem of mining. The width of the banket ranges from 6 to 45 in. and some of the stopes are but 18 in. wide. Underhand methods of stoping are usual. Kafirs are employed for practically all manual labor, and in efficiency these natives rank low; they rig the drills and carry them about the stopes, a white man usually supervising the operation of two or more machines.

COST OF COMPRESSED AIR PER 100 CU. FT. OF FREE AIR COMPRESSED.

Pressure, Lb.per Sq.In.	Cost in Cents.
50	0.40
60	0.50
70	0.54
75	0.60
80	0.64
90	0.70
100	0.76

On account of the toughness of the ore and inability of the Kafir to lift a heavy machine, a light powerful drill is required. The weight limit fixed by the competition committee was 100 lb., but as five natives were alloted to two drills, a limit of 125 lb. would have permitted better proportioned machines without too greatly increasing the weight for the men.

The report of the committee does not give the power required for the various machines, but in the accompanying table the quantity and pressure of the air used by a number of machines are given. Compared with the average mine in the United States the pressure used on the Rand is low, and probably the drills would have shown greater efficiency had the pressure ranged from 80 to 90 lb. in-

stead of 66 to 75 lb. That short-time tests at the surface, on granite blocks, do not give reliable comparison, is shown by the record of drilling speed obtained at the surface and during the competition under actual working conditions.

The width of the stopes in which the competition took place varied from 24 to 45 in. There were two periods of 43 shifts at an average stope width of 30 in.; three at an average width of 35 to 36 in. and seven at an average width of 36 to 40 in., this showing that the machines were capable of narrow stoping. It was not the fault of the machines that the whole of the stoping was not done at less than 40 in., but the mining requirements had, of course, to be met.

Underhand stoping is used principally on the Rand, little back stoping being done, and for this work the air-hammer there is little back stoping carried on here.

(2) Hollow steel is not at present recommended, the class of material used in its manufacture not being suitable. It is a high-priced article, but it appeared to crystallize more rapidly than the cheaper solid steel, and gave more difficulty in tempering, which process, however, it should be stated, was carried out by smiths used to the cheaper material ordinarily used.

(3) No new type of rig-up gear was shown to be efficient. All the finishing machines used the well known type of lock bar and screw, with arms and clamps usually of the Holman type.

(4) Any capable miner can supervise efficiently more than two small machines, to which number he was restricted by the rules of the competition.

RESUME OF RESULTS OF TRANSVAAL STOPE DRILL COMPETITION.

Name of drill	Holman, 2½ in.	Siskol	Holman 2¾ in.	Chersen	Waugh	Murphy
Type of drill	Piston	Piston	Piston	Piston	Air Hammer	Air Hammer
Dust allayer used	None used	Jet through hollow steel	None used	None used	Water and Air through hollow steel	Jet through hollow steel
Diameter of cylinder, in	2½	2⅜	2¾	2¾	2	1½
Stroke, in	4½	6	6½	6	3	1¾
Weight, lb	99	95½	99¾	96¼	80¼	80¾
Total footage drilled in 215 eight-hour shifts	12,779	14,083	11,744	11,781	.....	.....
Air used, surface trials, cu. ft. per ft. of hole	376	202	385	239	252	169
Air pressure, surface trials, lb. per sq.in.	74	76	69	74	74	74
Air pressure, underground trials, lb. per sq.in.	72	76	75	76	76	72
Air pressure, average during competition, lb. per sq.in.	67.88	73.92	66.65	71.70	.....	.....
Drilling speed at surface trials, in. per min., actual drilling time	2.393	4.337	3.110	4.110	2.428	2.916
Drilling speed at surface trials, in. per min. over total time	1.566	2.058	1.988	2.515	.....	.....
Drilling speeds in competition, in. per min. over total time	0.818	0.742	0.684	0.682	.....	.....
Total cost per ft. hole drilled, cents	19.54	19.80	21.82	23.88	.....	.....
Spares, per ft. hole drilled, cents	0.92	2.53	1.89	5.07	.....	.....
Stores, per ft. hole drilled, cents	0.86	1.03	1.00	0.98	.....	.....
Depreciation, per ft. hole drilled, cents	2.23	1.98	2.08	1.73	.....	.....

drills did not appear to be suited. It is also stated that the hollow steels broke continually, and frequently stuck in the hole after drilling a certain distance, due to the cuttings jamming in a cement-like mass, between drill and hole. The underground manager in his report stated that there is no reason why hammer drills cannot be used for stoping, using a separate jet to allay dust, and solid steel, but that he believes a water hollow-steel arrangement will be designed that will not throw water about, but send it up the hole where it is wanted.

The following deductions were drawn from the observations of the committee, adopting the phraseology of the report.

(1) Hammer drills are not at present suitable for the general stoping conditions which obtain on these fields. That is to say, for down holes the reciprocating drill has proved its superiority, and

(5) No two machines finishing in the competition could be efficiently run unless the miner had five native assistants.

(6) It is essential that the arrangements made for the supplying of drills, stores, etc., to the miners should be good, as a short supply of drills often causes the loss of half a shift.

(7) Seeing that five boys for two machines weighing under 100 lb. are necessary, it would be better to strengthen the machines, adding slightly to their weight, but greatly to their durability. Two boys can handle a machine weighing 125 lb., practically as quickly as one weighing 100 pounds.

(8) Under suitable conditions, both as regards mining and efficient working, it is possible to break ground as cheaply and keep stopes as narrow as required with small machines as with hand-hammer boys.

(9) The machines entered in the trials have shown that valve gears operating with a very short stroke are not as efficient as those with a longer stroke, due to the fact chiefly that the greater motion gives more clearance, and therefore is less liable to become choked by small particles of dirt passing through the air pipe.

(10) Machines with longer piston strokes have proved themselves in advance of those of shorter stroke, and have been able to get out broken ground more easily, and also to drill deeper holes.

(11) Provision for a feed of not less than 18 in. in local mines appears desirable. All this, it will be seen, takes us back to the question of efficiency, and points to the need for an increased supply of trained young miners if the best results are to be obtained from the use of small drills.

An accompanying table gives in concise form the results observed on the performance of the four machines that completed the contest and also, for comparison, such data as are obtainable of the air-hammer drills.—EDITOR.]

Huff Electrostatic Process

In the *Journal* of Feb. 4, there is a short reference to the Huff electrostatic process, which gives the impression that the process is applicable only to zinc ores, and that the American Zinc, Lead and Smelting Company controls the Huff company. This general misunderstanding concerning the applicability of the Huff process seems to have arisen from the fact that the Huff process was first applied on zinc ores by the American Zinc, Lead and Smelting Company and the United States Smelting, Refining and Mining Company, whereas the Huff process is now being used for the treatment of ores other than those of zinc, as for example silver ores in Nevada. In fact we expect a larger tonnage from crude ores carrying no appreciable amount of zinc than from the zinc field, especially from those regions where large bodies of copper and other sulphide ores exist in heavy gangue or where water is scarce.

The American Zinc, Lead and Smelting Company has an exclusive license for the use of the process for the treatment of ores containing zinc, from which a marketable zinc product is made. The Huff company is on the friendliest of terms with the American Zinc, Lead and Smelting Company and with the United States Smelting, Refining and Mining Company, and sincerely appreciates the progressive and right spirit in which they have coöperated to demonstrate this process and to extend its utilization, but it is our desire to build up a large and independent business and organization.

HUFF ELECTROSTATIC SEPARATOR CO.
C. H. HUFF, President.
Boston, Mass., Feb. 7, 1911.

Organizing the New York Curb Market

The agent of the Curb market, with the assistance of an advisory committee, has prepared a constitution which has been submitted to the Curb dealers for their assent. In presenting this, the agent, E. S. Mendels, calls especial attention to two principal facts:

(1) That the association is organized to deal only in securities not dealt in on any department of the New York Stock Exchange; and when any such security is at any time listed by the Stock Exchange, trading and quoting sales of the same must at once cease.

(2) That the New York Curb Market will remain a public street market, and will be open to all who choose to trade there, subject only to the usual customs of business that no one is obliged to accept a contract unless assured of the fact that the person making such contract is reliable and will fulfill the same.

The constitution provides for the organization of the New York Curb Market Association, which shall be ruled by a board of 15 representatives. The officers provided for are, chairman, secretary and treasurer; with standing committees on finance, commissions, admissions, listing, complaints, law, and on constitution and by-laws; also an arbitration committee to adjust disputes and differences. It also provides for the discipline or expulsion of any member charged with fraudulent acts, and generally for more regulation of the market than has hitherto been usual.

New Lead Smeltery at Fiume, Hungary

JENA CORRESPONDENCE

Hungary consumes a considerable quantity of lead in the shape of manufactured articles, three-fourths of which have to be imported on account of the steady falling off in the home production of lead ore. To remedy this evil, Manfred Von Weiss, an owner of large rolling mills near Budapest, intends erecting a custom smeltery of an initial capacity of from 15,000 to 20,000 tons of lead ore per annum in the vicinity of Fiume, Hungary's principal port of entry. The ore will be imported from North Africa and Australia through a Frankfort firm of metal merchants (presumably Beer, Sondheimer & Co.), who will take an interest in the enterprise of the Hungarian capitalist. Moreover, the Hungarian minister of finance has promised his support in procuring a state subsidy for it. The works are to cost between two and three million kronen (from $400,000 to $600,000), which probably includes the outlay for fuel and ore. It is also intended to manufacture bluestone and spelter as secondary products.

Guanajuato Reduction and Mines Company

During the year ended Dec. 31, 1910, the Guanajuato Reduction and Mines Company produced 44,213 kg. of silver and 556,476 kg. of gold, from ore containing 193 grams of silver and 2.4 grams of gold per metric ton. The average recovery of silver was 81.45 per cent. and of gold 85.02 per cent., an increase over the extraction effected during the previous year. A total of 228,344 metric tons were milled, of which 418 tons was custom ore; 45,430 tons was taken from the filling in the old stopes of the mines, and the remainder from old dumps. The average value of ore milled was 9.80 pesos as against 9.37 pesos per ton for the preceding year. The average price received for silver was 53.48c. per oz. The profit over all expenses incurred in Mexico was 3.24 pesos per ton as compared with 1.65 pesos in 1909.

WORKING EXPENSES OF THE GUANAJUATO REDUCTION AND MINES COMPANY, 1910.

Operation.	Total Cost, Pesos.	Per Ton of Ore, Pesos.
Mining	101,260	0.443
Purchasing and transportation	59,539	0.261
Handling dumps	52,592	0.231
Milling	234,973	1.022
Cyaniding	376,028	1.636
Guanajuato administration	56,561	0.246
Selling expense	195,462	0.856
Total operating cost	1,076,415	4.695
Development and improvements	47,726	0.194
Net profit	743,675	3.240
Total income	1,867,816	8.129

The total value of metals recovered was 1,867,816 pesos as against 1,561,405 pesos in 1909; the total expenses in Mexico were 1,124,140 pesos in 1910 and 1,208,254 pesos in 1909; the profits were 743,675 pesos for 1910 and 353,150 pesos for 1909. The last year was the most prosperous in the history of the company. The bulk of the mill ore was taken from the dumps, of which about 500,000 tons remain to be treated, not including the Veta Madre dump in which there are estimated to be 411,000 tons. Filling of the old stopes which can be removed and treated at a profit amounts to about 500,000 tons.

SUMMARY OF OPERATIONS FOR 1910.

Source of Ore.	Weight, Metric Tons.	Total Value, Pesos.	Value per Ton Pesos.
San Antonio dumps	32,192	224,071	6.96
Mellado dumps, Boca Mina and Creston	84,494	641,954	7.60
Rayas dumps	63,856	537,642	8.42
Cata mine	3,881	52,742	13.59
Valenciana and Tepeyac mines	11,092	118,350	10.67
Mellado mine, San Miguel	12,680	112,442	8.86
Mellado mine, Crucero Principal	10,766	79,162	7.35
Rayas mine	8,964	80,622	8.99
Custom ore	419	9,300	22.22
Totals	228,344	1,856,284	8.13

During the last year a great advance was made in the knowledge of what can in the future be done with the great bodies of old stope filling. This filling, generally compacted by the settling of the hanging-wall, lies in the worked parts of the mines like new soft veins of lower grade than formerly existed there. The extent of the filling makes its profitable working a matter of great importance to the future of the company's operations. Until new ground has been opened, the ore for the mills must come from the dumps and the filling. A new method of working the filling has been developed that gives assurance that it can be profitably worked as it exists in grade and extent. The year's work in this direction has made it possible to calculate an ore reserve from this source that could not safely have been relied upon a year ago. In opening this filling 19,194 pesos have been expended that have been charged to development work. Another project of much importance to the company is the completion of the unwatering of the Rayas and Mellado mines so that the lower levels may be developed.

Iron—A Pittsburg View

SPECIAL CORRESPONDENCE

Sentiment in the iron market continues to improve, and by sentiment in this case is meant the gossip and predictions indulged in throughout the trade. The more conservative now fear that this will be overdone and that if actual business should fail to increase week by week a chill will be given. The conservative place emphasis upon the fact that a great deal of business was being held back in December from a variety of causes, so that the release of this business does not necessarily presage a continued improvement. Of improvement in fundamental conditions there has been relatively little.

A feature of the situation which is emphasized, however, is that through the continued curtailment in general business a great deal of idle capital has accumulated, and this capital is bound to seek investment, so that in the long run new projects of importance are sure to mature, barring accidents. The iron and steel trade is, in the long run, bound to work up to a better level, but whether the position will be attained without backsets, or before the second half of the year is entered upon, is a matter of doubt.

Application has been sent to the New York Stock Exchange to list $12,000,000 capital stock of the Ray Consolidated Copper Company and $3,500,000 of the Chino Copper Company.

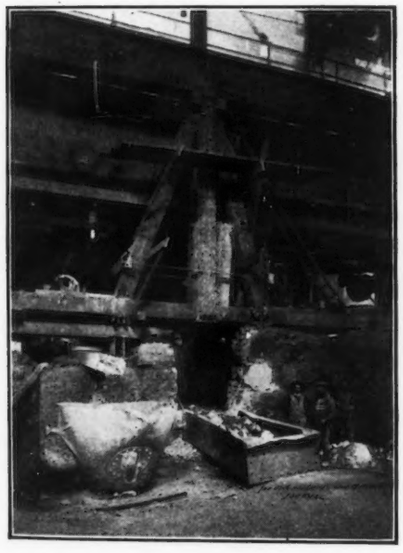
Details of Practical Mining

This department is designed to treat in a brief way of details of everyday practice. Many readers are doing interesting things in mining and milling that other readers like to know about. The thought that there is nothing new in them should not be a deterrent of telling about them. Something that is an old story in one district may be quite unknown in another. Our draftsmen can develop any kind of a pencil sketch that is intelligible. A blueprint answers all the purposes of the engraver. Contributions are solicited.

Notes of Interest to Prospectors and Operators of Small as well as Large Mines Things that have to be done in Everyday Mining

Shoring Up a Crane Runway

The accompanying illustration was made from a photograph sent by Charles F. Shelby, late general superintendent of



SHORING UP A CRANE RUNWAY

the smelting department of the Cerro de Pasco Mining Company, and shows the method used at La Fundicion, Peru, to shore up the crane runway, during alterations. The foundation of this runway was formerly of rubble masonry, which is now being removed and concrete substituted.

In making cleanups at the Florence-Goldfield mill the amalgam from the batteries and the plates is ground in a small grinding barrel with sodium peroxide. The sodium peroxide attacks the base metals in the amalgam and oxidizes them so that they cannot again go into the amalgam. In this way the bullion from the cleanups has been made to run 997.6 fine, while formerly it rarely ran over 930 fine.

Freezing of Compressed Air Pipe Lines

BY STACY H. HILL*

In nothern countries great inconvenience is caused by the freezing of compressed-air pipe lines. The difficulty has been eliminated to some extent at permanent, well regulated properties by burying the pipe. Even in these installations trouble is often experienced in the smaller lines to blacksmith shop or exploratory shafts, which may be at some distance. A method whereby this difficulty could be eliminated for all time would be acceptable and has been the cause of much study, as nothing disorganizes a force of men so much as the gradual or sudden loss of air supply.

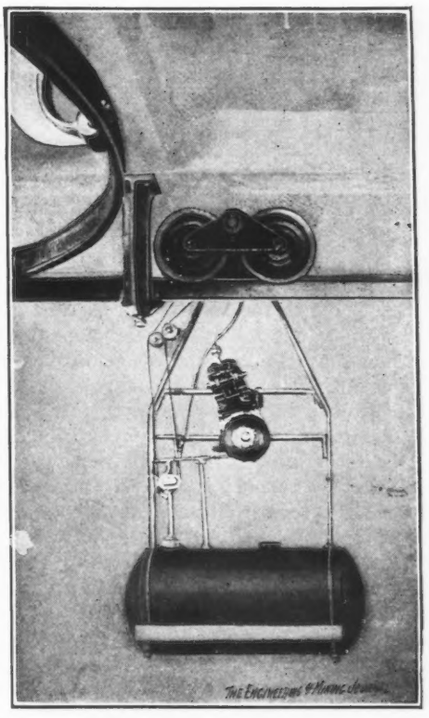
In the latitudes where weather from zero to 40 deg. below is occasionally experienced, the pipes freeze from the circumferenc, gradually diminishing the pipe area until the passage is entirely stopped. As a preventive of this, the introduction of salt or sal-ammoniac has been found very effective up to the moment of entire blocking of the pipe. At a number of properties a barrel of salt is kept in the engine room and at regular periods, usually at the beginning and middle of each shift, several pounds are introduced into the pipe line just beyond the air receiver. The pressure is then increased by the air compressor and the salt blown through the pipe, flushing out the ice. The quantity of salt necessary is, of course, dependent upon the size of the plant. There is a record of one line transmitting approximately 1000 cu.ft. of free air per min. for 1700 ft. where two barrels of salt were used in the course of the five winter months, and completely did away with all freezing troubles.

In pipe lines where sags exist, no trouble is encountered by freezing in the dips, as the salt collects as brine, preventing freezing. For quick relief from a partly frozen line, the pipe is sometimes used as a part of an electrical circuit temporarily until the pipe is warmed sufficiently to blow the ice out.

*218 Providence building, Duluth, Minn.

Oiling Tramway Track Cables

An accompanying halftone shows the machine used to oil the track cables on the Balaklala aërial tramway, at Coram, Cal. It consists of a carrier frame arranged to carry an oil tank having a capacity of 10 gal. This carrier frame is fastened to a set of trolley wheels turned upside down, so as to secure a space between the wheels for the oil jet directly over the track cable. By means of



A TRAMWAY TRACK OILER

two gear wheels, one of which is mounted on the extended axle of one of the trolley wheels and the other secured to the trolley frame and carrying a wheel for the belt running the oil pump, mounted on the tank, the speed is so reduced that the rotary oil pump, used to send the oil to the oiler over the track cable, does not run too fast. By means of a cock in the pipe leading to the oiler the supply of oil to the cable is controlled.

After a rain the supply is so regulated that enough oil is fed to run down and cover all the cable, while at other times the supply is only enough to cover the upper side. When the valve has been properly regulated to give the right amount of oil, the carrier is gripped to

the traction rope and the automatic oiler is sent out over the line. This oiler works quite satisfactorily at the Balaklala mine where it was designed.

A Substitute for Platinum Triangles

By R. C. Benner*

While working with an alloy of nickel and chromium in the form of a resistance wire, its resistance to common laboratory fumes and to oxidation at ordinary blast-lamp temperatures made me think that this wire might be used to advantage to replace the ordinary platinum triangle. Several triangles were made by twisting together the ends of three pieces of No. 13 "nichrome" wire (a size or two larger could be used to advantage) each about 4 in. long. The triangles made in this manner were used to support platinum crucibles, which were ignited side by side with others supported either on platinum or common pipe-stem triangles. The crucibles showed about the same loss in weight when ignited by similar means on any of the triangles mentioned. This was true whether they were ignited over a Bunsen burner, blast lamp, using city gas (containing a large amount of sulphur) or a gasoline blast lamp. The nichrome triangles themselves, when used with city gas, either over the Bunsen or the blast, lost at most one milligram per hour and at times showed either a slight gain or no loss at all. When the gasolene blast was used (this did not contain any amount of sulphur) the loss of either the crucible or the triangles was not more than 0.2 or 0.3 mg. per hour. One of these triangles will outlast a number of pipe-stem triangles and at the same time allow a higher temperature to be obtained in the crucibles. In fact they make a good substitute for the platinum triangle and cost many times less. This article has been put on the market by C. R. Stœlting & Co., of Chicago.

Determining the Face of Winding Drums

In determining the face of winding drums when the diameter of the drum and the rope diameter are known, the accompanying charts will be found useful.

Assume that the drum has a diameter of 8 ft., and that the rope diameter is 1¼ in.; also that the shaft is 475 ft. deep; then referring to the chart marked "straight-face grooved drums," it is found that an 8-ft. diameter drum will wind 227 ft. per foot of face. The drum required would therefore have to be, say, 2 ft. 6 in. face, which would allow a sufficient number of grooves at one end of drum for fastening the rope.

*University of Arizona, Tucson, Ariz.

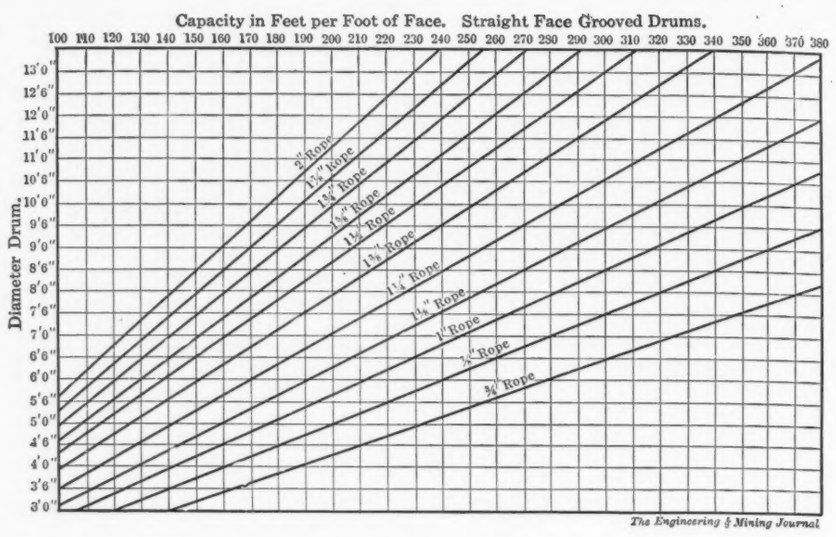
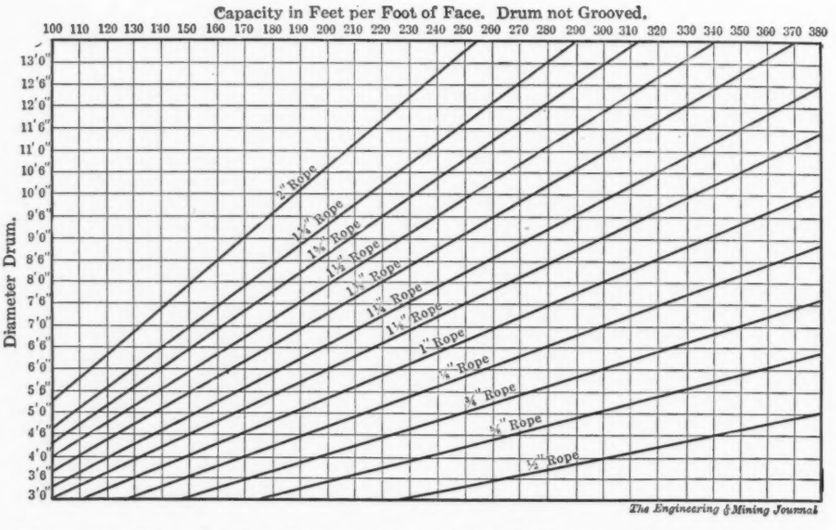
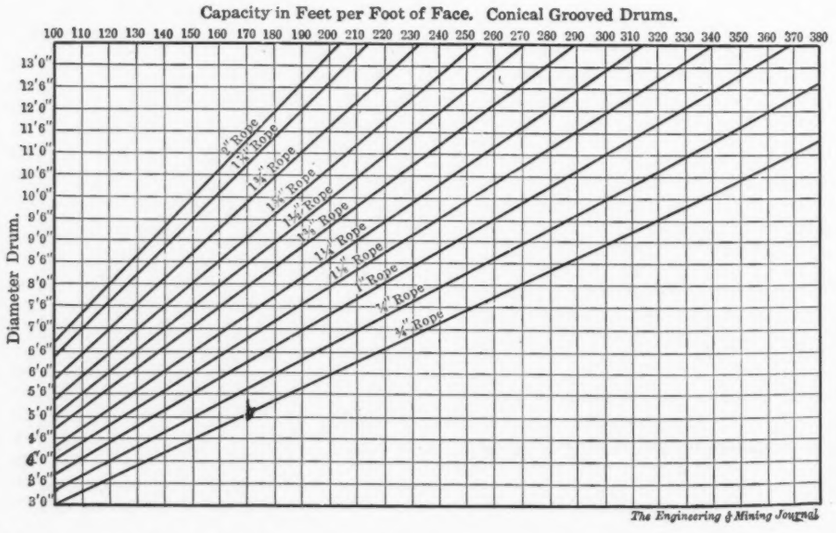


Chart for Determining the Face of a Grooved Drum



When the Drum Is Not Grooved, This Chart Is Used to Determine the Face



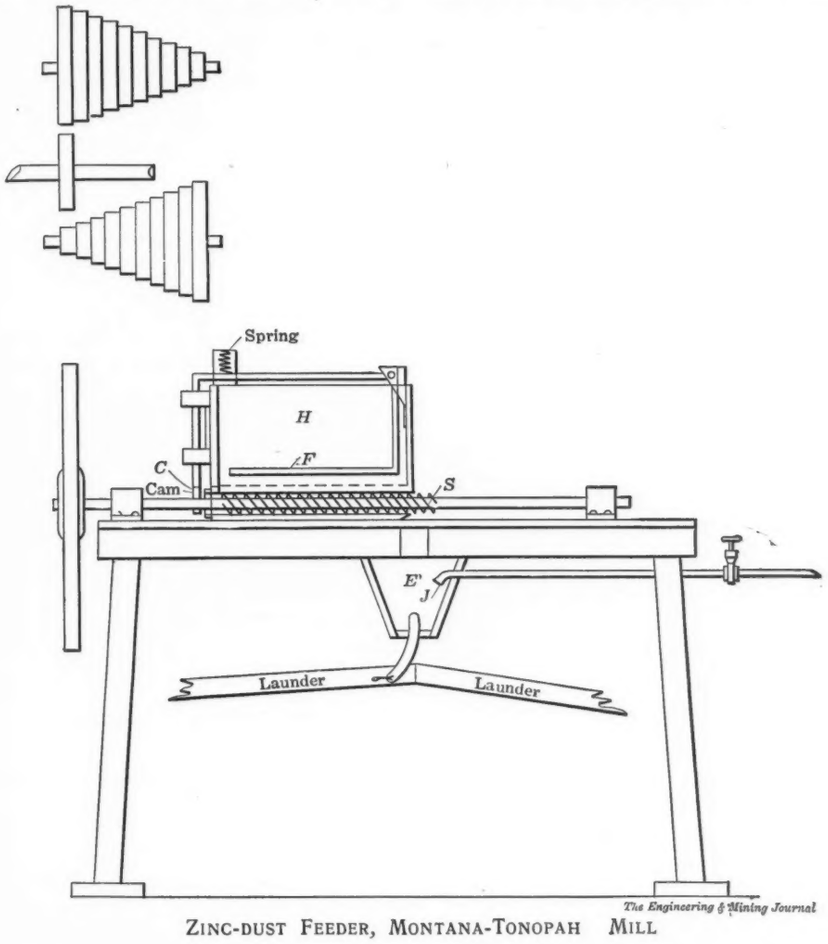
If the Drum Is Conical, This Chart Is Used and the Diameter Should Be the Mean Diameter

The other charts on straight-face drums not grooved, and conical grooved drums would, of course, be used in the same manner as illustrated above. The diameter used for conical drums, however, should be the mean diameter. [Note—This is the fourth instalment of charts prepared by L. F. Mitten, of the Vulcan Iron Works, Wilkes-Barre, Penn.].

An Improved Zinc-Dust Feeder

By Claude T. Rice

It is important when using the zinc-dust method of precipitation from cyanide solution to feed the zinc dust to the solutions evenly, for, if the feed is not even, too much gold is precipitated in the press itself. This is not an efficient way of using the zinc, for the zinc particles are brought more in individual contact with the solution when the zinc is emulsified with the gold solution in the pipe line after it has gone through the pump and the whole thoroughly agitated, than when the solution is trickling through the zinc-dust cake in the press. Still, with the best mixing of the zinc dust and solution, unless there is a longer pipe than usually exists, through which the solution and zinc dust must pass before the press is reached, some precipitation remains to be done in the press. Where a silver solution assaying 0.035 oz. gold and 2.5 oz. silver per ton of solution is being precipitated, as at Tonopah, all the precious-metal contents of the solution would be precipitated by the time that the solution has passed through 150 ft. of piping, provided that enough zinc was added.



Zinc-dust Feeder, Montana-Tonopah Mill

Zinc Dust Formerly Simply Shoveled into Precipitating Vats

In the old method of precipitating the solution by means of zinc dust, as practised for years at the Consolidated Mercur mill, at Mercur, Utah, the zinc dust was poured in large quantity into a vat where it was violently agitated for a time with the solution, but in a few hours the bulk of the zinc dust was in the presses and the main precipitation had to be done there. This resulted in a large excess of zinc in the precipitate so that it became necessary to cut down the precipitate by means of sulphuric acid before refining. Moreover, there is an oxidation of the zinc dust in the press which results in a higher consumption of zinc.

Merrill's Belt Feeder the Next Step

Mr. Merrill, when he adopted zinc-dust precipitation, devised the method of feeding the zinc dust to the solutions by a belt that has become almost an integral part of the process, as most of the zinc-dust precipitation plants in the country have been installed by him. The great drawback to the belt system is that the length of belt that it is practical to use in feeding the zinc dust is limited and so the zinc dust must be piled on the belt in a thick layer. As a result, the zinc dust is not fed continuously to the solution as theory requires, but instead it is found that the zinc dust at times does not feed to the emulsifier for several minutes because, especially when the air is a little damp, it banks up and does not give away at the end until its angle of repose has been surpassed. Then the zinc dust starts and feeds quickly until it has assumed again a slope that is equal to the angle of repose that limits motion, quite a different thing on account of friction and inertia from that which has to be surpassed in order to start motion again in the zinc dust. Of course, the emulsifier, which consists of a cone with an air jet for keeping the zinc dust in suspension, acts somewhat as a trap to equalize the feed of the zinc dust to the solution going to the suction pipe of the pump, but still the feed is intermittent and probably not so effective as when the zinc dust drops continuously into the emulsifier. At the Goldfield Consolidated mill, where the Merrill belt feed is used for supplying the emulsifier with zinc, observation has shown that the zinc will at times hang up so that not a particle of dust is fed to the emulsifier for as much as five minutes.

Ordinarily, in the Merrill method of feed, the belt is driven from floats in the gold tanks, but sometimes this is not convenient as the gold tanks often have small capacity. Such is the case at the Central mill at Grass Valley, Cal., where the belt is driven by means of a ratchet-actuated gear wheel driven from the solution pump that feeds the presses. This ratchet method is necessary in order to step down the high speed of the pump to the slow feed of the zinc-dust belt. By means of varying the throw of the ratchet the feed of the zinc is adjusted. An accompanying photograph shows the feeding mechanism used at the Central mill.

Wet Zinc Dust Burns Belt

A minor drawback of the belt feed is that, in case water should drop on the zinc dust on the belt and there should have been any decomposition of the zinc, a hole will be burnt in the belt and in case no one is near, the whole belt will burn up. Such an accident happened at the Central mill, where fortunately someone happened to be nearby at the time so that the fire was put out before it had greatly damaged the belt. Moreover, the spreading out of the zinc dust

evenly upon the belt takes time, all of which is avoided in the zinc-dust feeder that will now be described.

This feeder, which was devised by B. A. Bosqui, superintendent at the Montana-Tonopah mill, gives a positively continuous feed of zinc dust to the emulsifier. It has resulted in the saving of 30 per cent. in the zinc consumption over the method of feeding the zinc by hand, the way that was first used at the mill.

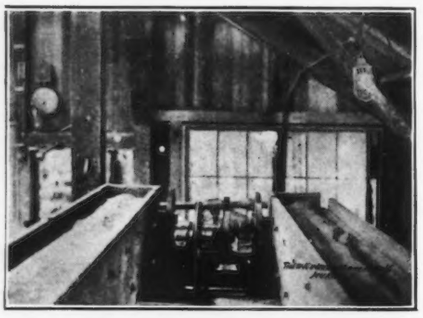
Bosqui's Screw Feed

In this feeder devised by Mr. Bosqui, the charge of zinc dust to be fed to the solution is stored in a hopper. In this hopper *H*, in an accompanying line drawing, there is a feeding arm *F* which is moved up and down so as to keep the zinc dust from packing in the hopper when the atmosphere is damp and so not feeding down through the slot in the pipe that envelops the screw feed below. This arm is the end of a belt-crank lever system that is raised by a cam mounted on the screw shaft of the feeder, while the return is effected by a spring. The feeder proper consists of a slotted pipe 1.5 in. in diameter in which rotates a screw that feeds the zinc dust ahead in the pipe and drops it in a continuous stream into the emulsifier *E*, shown in the sketch. This screw is turned from an old piece of 1.5-in. shafting and has threads cut in it about half an inch deep and pitched two per inch.

The emulsifier consists of a small box with a hose attached to a short nipple as a discharge so that the feed of zinc dust can easily be turned into whatever one of the three launders leading to the different gold tanks that it is desired. The emulsification is effected by a spray of barren solution that issues from a jet *J*, pointed downward at an angle of 45 deg. so that it hits the bottom of the emulsifier box at the point where the zinc dust strikes as it falls from the screw feed. Owing to the considerable force of the spray, as the barren solution issues from the jet under a pressure of 40 lb. per sq. in., and the fact that the jet strikes the bottom at an angle of 45 deg., a good emulsification is obtained and at less expense than when a jet of air is used in a cone.

The emulsion of zinc dust and solution then flows through the launder to a small pipe which takes the emulsion to a small sump box in the gold tank about 12 in. square and 9 in. deep with which the suction pipe of the pump supplying the press at the head of the mill is connected. In this way an effective emulsification of the zinc is obtained and an intimate mixture of individual zinc-dust particles with the solution is effected.

The speed of the feed of zinc dust to the emulsifier is regulated by means of a set of cone pulleys driven from the main shaft that also drives the solution pump feeding the zinc press. By means of these cone pulleys the speed of the big driving wheel is changed through a range of 3 to 15 r.p.m. as each step on the cones is equivalent to a change of one revolution in the speed of the big wheel. This driving wheel is made large

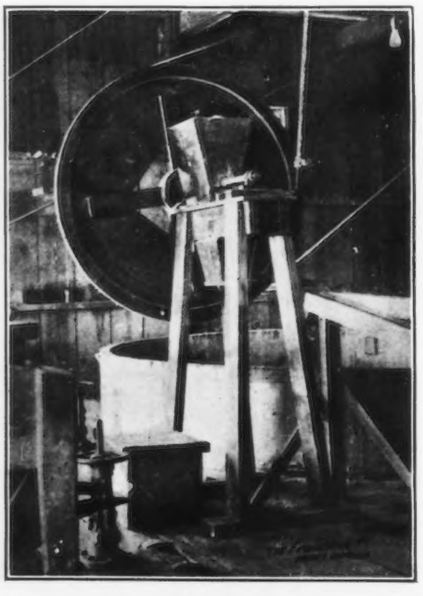


Belt Zinc-dust Feed at Central Mill

so that a steady drive to the screw is obtained.

Speed of Feed Varies with Tail Solution Assay

The wheel's speed is changed only by the superintendent, who varies the speed according to the assay of the tail solution from the zinc press. Generally after a clean-up the pump is speeded up so as to get an excess of zinc in the press;



Improved Zinc-dust Feeder

then gradually as the precipitate accumulates in the presses the speed is cut down, watch being kept on the tail solution until there is only a small excess of zinc in the press.

At present the men keep track of the amount of zinc fed by means of a schedule on which is given the capacity of the head tanks in tons corresponding to different hights in inches of solution, and the amount of zinc fed per ton according to the number of revolutions at which the wheel was rotating and the amount of drop in the head solution tank. The solution man times the wheel and gets the number of revolutions, and then reads the tell-tale for that tank and gets with these data from the schedule the amount of zinc that has been fed. But as the amount of zinc fed per revolution of the screw varies with the atmospheric conditions as these affect the dampness of the zinc, the feed computed in this manner has to be checked frequently by using weighed amounts. Consequently, it is the intention in the future to keep the amount of feed of zinc by means of weighing the actual zinc put in the hopper of the feeder. An accompanying halftone shows the feeder as installed at the Montana-Tonopah mill.

Device for Oscillating Laboratory Balances

The method of starting the oscillation of a balance by means of an air jet introduced under the balance pan is somewhat old. The device ordinarily employed consists of a tube for which a hole is bored through the glass floor of the balance, a small rubber bulb being attached to the other end of the glass tube.

In order to leave both of the operator's hands free for use of the spatula, etc., F. C. Ryan, of the United States Metals Refining Company, has adopted the scheme of extending the air passage by means of a rubber tube, to the floor, and placing the bulb at such a point that it can be squeezed with one's foot.

The general advantage of the air-jet method of oscillating a balance is that one does not dull the knife edges any, as one does by causing the swinging through suddenly dropping the pan supports.

Underground Electric Hoists on the Rand

Only a few large electric hoists have, as yet, been installed underground on the Rand, according to R. G. Mackie, (*Journal* Transvaal Inst. Mech. Engs. Oct., 1910). In deep mines, however, the necessity for stage winding is becoming apparent. A great many of the compound shafts will soon be changed to stage hoisting, and the class of stage hoist which is to be generally adopted is a geared double drum, driven by a three-phase induction motor with liquid resistance control. The large excavations which would be required underground to accommodate the Ilgner, or other regenerative system of electric hoisting, is one of the greatest objections to its installation in a mine, while the initial cost of the winding gear is also high.

Guggenheim Exploration Company

The Guggenheim Exploration Company reports for the fiscal year ended Dec. 31, 1910, net earnings equal to 16.1 per cent. on the $20,793,330 par value of stock issued. The profit and loss surplus on that date was $15,124,589, an increase of $1,267,524 over the previous year. Cash, loans and accounts collectible aggregate $2,924,645. Daniel Guggenheim, the president, says that the figures indicate that the company has had a highly satisfactory and prosperous year. In 1909 the company earned 14.7 per cent. on its outstanding stock.

Following are the details of "other properties and investments" for the last two years:

	1910.	1909.
Esperanza, Ltd.	$302,331	$322,347
Utah Copper Co.	9,022,986	4,788,648
Yukon Gold Co.	9,786,409	9,794,639
Miscellaneous investments.	17,224	9,510
Nevada Cons. Copper Co.[1]	.....	4,234,408
Total	$19,128,950	$19,149,552

[1] For 1910, included under Utah Copper Company item as Nevada Consolidated shares were exchanged for Utah Copper shares during the year.

All of the above items are carried at cost. The balance sheet for 1909 and 1910 follows:

ASSETS.

	1910.	1909.
Treasury stock	$1,206,700	$1,206,700
Amer. Smelters Sec. Co. (a)	13,860,000	13,860,000
Amer. Smelters Sec., com.	1	1
Other properties and investments	19,128,950	19,149,552
Furniture and fixtures	4,293	6,936
Bills and accounts collectible	725,895	1,170,801
Cash and demand loans	2,198,750	1,463,075
Total assets	$37,124,589	$36,857,065

LIABILITIES.

Capital stock	$22,000,000	$22,000,000
Bills and accounts payable	.....	1,000,000
Surplus	15,124,589	13,857,065
Total liabilities	$37,124,589	$36,857,065

American Institute of Mining Engineers

A circular from the secretary says that, subject to obstacles and necessary changes of plan not now foreseen, a meeting of the Institute will be held at San Francisco, Cal., in the earlier half of October, 1911. Further details concerning this meeting, including, if practicable, a visit to the Grand Cañon of the Colorado, in Arizona, will be announced later.

After the close of the San Francisco meeting an excursion to Japan is contemplated for such members and guests as may be able to take part in it, not exceeding (according to present calculations) 100 in number. This party would sail from San Francisco Oct. 17, arriving at Yokohama Nov. 3, witnessing the festivities in Tokio, connected with the birthday of the Mikado, remaining in Japan 18 days, and returning by the steamship which leaves Yokohama Nov. 21, and arrives at San Francisco Dec. 7. This excursion has been planned in response to repeated urgent and cordial invitation from Japanese members, together with assurances of special attentions and facilities from the industrial establishments and government officials of Japan. There is no doubt that it would be made memorable as an opportunity for the expression of international hospitality. Dr. Joseph Struthers, whose management, upon his own personal responsibility, of the recent trip to the Canal Zone, has been enthusiastically approved by the members of that party, has consented to undertake the organization and conduct of the Japanese excursion, upon sufficient encouragement from members.

The expense of the trip from San Francisco and return, including hotel accommodations and transportation in Japan, will be about $500 per person.

Members desiring to join this party should notify Doctor Struthers immediately, accompanying such notice with remittance of $10 for each person concerned.

John C. F. Randolph

John C. F. Randolph was born in Trenton, N. J., Dec. 20, 1846, and died in Morristown, Feb. 3, 1911. He was the son of Judge Joseph F. Randolph, of New Jersey, and the grandson of Dr. John Cooper, of Easton, Penn. His Randolph forefathers had lived in New Jersey for 200 years before his birth—all devout and upright men, living on their own land.

Mr. Randolph graduated at Princeton College in 1866, and at the Columbia School of Mines in 1869, being almost the first "E. M." in the United States. He afterward studied in Göttingen, Tübingen and Vienna. His first employment was in 1871 in the service of the United States Government in the structural cast-iron work of the Lighthouse Board. In 1873 and 1874 he was in the service of the Japanese government as professor of metallurgy in the University at Tokio. In 1884 he was in the service of the Chinese government, engaged in examination of gold lands on the Yangtse river, and in 1888 in the service of the republic of Colombia in South America, as commissioner of mines in the Tolima district. At other times he was engaged for English and American bankers and syndicates in extensive examinations in Colorado, Montana, California, Arizona, Canada, Mexico, Cuba, Peru, Borneo, China and India.

It was his boast that he had saved fortunes rather than won them; that he had told the exact truth to clients and had never negotiated sales. He had a consulting office in New York for about 35 years; was a member of the University Club and the Down Town Association in New York, and of the Morristown Club and of the South street Presbyterian church. He was a man of wide acquaintance in many lands, and knew their great songs and music and pictures and scenes and customs as well as their mines. He lived in Morristown for about 20 years. He never married.

The Calumet & Hecla Consolidation

The proposal of the Calumet & Hecla management is arousing some strong opposition in the Lake Superior country, especially among Ahmeek and Osceola stockholders. Thomas L. Chadbourne has issued a circular against it, which is having much influence. On the other hand the committee appointed by the Boston Stock Exchange to consider the advisability, from a Stock Exchange point of view, of the proposed merger has reported favorably, saying:

"We believe, under present conditions, that the intrinsic worth of the combined companies will be greater than the intrinsic worth of the several companies. We believe that the directors of the various companies have made an exceedingly thorough and honest effort to find a just basis of consolidation; that the principles of arriving at these valuations are correct; and that whereas many of the factors cannot be exactly determined, we believe, on the whole, that the valuations reached are equitable, and that each and every detail has been given due consideration.

"The committee has come to the unanimous opinion that the plan is conceived with absolute intent toward fairness, and is as fair a plan as could be produced under existing conditions.

"It is quite possible that some of the producers might fare rather better under favorable conditions as independent properties for a period of ten years. It should be clearly understood that this is dealing on the one hand with a large, low-cost producer, and on the other hand with eleven comparatively high-cost producers."

In a letter to Quincy A. Shaw, president of the Calumet & Hecla, the committee makes a suggestion concerning the capitalization of the new company. It says that to make the consolidation plan more acceptable, steps should be taken to so adjust the capitalization of the new company, through a holding company or otherwise, that the number of shares issued shall be greater, thereby giving stockholders a security selling in the market around $50 a share, rather than $200. The high price for the new unit, which it is proposed to create, deprives a large body of people who have dealt for many years in their favorite Lake Superior stocks from enjoying any speculative possibilities that may attach to the new securities, and there is, besides, the great advantage of a broader market which the smaller unit would effect.

New York Curb Market in 1910

The trading in mining stocks on the New York Curb decreased greatly in 1910. According to official tables the total sales in 1910 were 34,172,548 shares; in 1909, 51,358,428 shares; in 1908, 41,946,351 shares; in 1907, 32,420,517 shares.

The number of shares traded in during 1910 and the price on the first trading day and the high and low during the year and the price on the last trading day, as reported by the Curb Quotation Company,

Review of the trading in mining stocks during the year 1910 *on the curb market. General level of stocks lower at close of year.*

quotations being the same in the accompanying table. There were 25 other stocks in which trading was light. The numerical averages of the four sets of quotations for these stocks were $25.02, $25.55, $18.29 and $20.90. There were 12 active stocks whose high was not over 50 per cent. above low. The averages for these were $7.63; $8.72; $6.09 and $7.13. Four of the 12 made small advances during the year. In 24 stocks with which

NEW YORK CURB STOCKS IN 1910.

		Open.	High.	Low.	Close.
43450	Alpha Copper	6¼	7¼	5	6
21100	Amazon Mon	6½	7½	3¼	3½
153965	Argentum	†12	13	2	2
116160	Arizona Cananea	2⅜	5⅛	2⅜	3⅜
3600	Barnes-King Devel	⅜	3	1/16	1/16
1000	Beaver Cobalt	†32	32	32	32
2660	Big Vein Cop	8⅞	9	8¾	8⅞
127882	Boston Copper	22⅛	22¼	16½	16½
1185800	Bovard Cons	†5	7	⅛	⅜
231543	Braden Copper	4 13/16	5 1/16	3 1/16	4
41900	Bradshaw Mining	†20	32	12	18
218745	Brit. Col. Copper	8¼	8⅞	4½	7½
500	Buffalo Mines	2⅛	2⅛	1⅞	2⅛
100	Butte & Balaklala	12⅝	12⅝	12⅝	12⅝
93060	Butte Coalition	27¼	29	15⅝	17⅝
500	Butte & London	†10	10	7	7
34300	Butte & New York	2	2½	1/16	1/16
111775	Caledonia Copper	1 7/16	1⅝	⅜	1 1/16
75	Calumet & Arizona	49	50	48	48
57688	Calumet & Mon	2¼	2⅜	†87	90
150	Cal. Yaqui R. Cop	2½	2½	2½	2½
115700	Canadian Mines	8¼	8¼	5	6⅜
185725	Carisa	†50	60	17	17
1243206	Chino Copper	12⅝	25¼	9⅜	21⅜
4300	Cobalt Prov. Mining	†52½	59	52½	59
14900	C. O. D. Cons	†9½	19	9	15½
2608975	Cobalt Central	†24½	25	5½	10
147925	Colonial Silver	½	¾	1/16	¼
292970	Combination Frac	†37	61	31	33
14300	Commercial Mining	†51	53	50	51
1250096	Con. Arz. Sm., new	3 5/16	3⅜	1⅜	1½
16800	Corbin Metal M	†50	55	50	51
1360	Crown Reserve	2.97	3½	2⅞	2⅞
1700	Cumberland-Ely	6½	6½	6½	6½
28970	Davis-Daly Asst. pfd	1¾	2½	1	1⅝
68480	Davis-Daly Copper	4⅝	4⅝	1 5/16	1 1/16
25	Daly West	8⅝	8⅝	8⅝	8⅝
7775	Dolores Copper	7½	7½	5½	5½
163695	El Rayo	2 13/16	4¼	2¼	4
3068200	Ely Central	2	2⅜	†4½	6½
35700	Ely Con. Asst. pfd	†35	38	27	33
1726475	Ely Consolidated	†78	93¾	15	32
2700	Ely Verde	†24	27	24	25
159000	Eureka Cons	†18	50	10	10
99262	First Natl. Copper	6⅝	6⅝	1⅜	2¼
83416	Florence	3½	3½	1½	1⅝
123090	Gila Copper	11½	11½	5	5
594700	Giroux Mining	11½	12½	6	6⅜
715300	Goldfield Cons	7 15/16	10	6 15/16	8¼
171300	Gold Hill Cons	1⅜	1¾	7/16	½
334425	Greene Cananea, new	11⅝	12	6¼	6⅝
1859050	Greenw. Cop. M. & S†	†13	23	3½	5½
50950	Guerrero Mines	2⅛	2½	1	1⅛
2898	Guggenheim Exp	250	250	160	195
1000	Guanajuato M. & M. Co	3	3⅛	3	3 1/16
2250	Guanajuato Cons	1⅜	3 1/16	1⅜	3 1/16
409775	Harcuvar	†50	75	9½	12
122700	Husted Mining	†65	80	48	48
466036	Inspiration Copper	9 5/16	10⅝	6⅜	8¾
1163	Inter. Smelt. & Ref	150	157	136	136
587310	Jumbo Extension	†50	62	21	25
526507	Kerr Lake	9¼	11	6	6⅞
97760	King Edward	¾	¾	†5	10
20	Lake Copper	35½	35½	35½	35½
290388	La Rose Cons	4¾	5	3⅛	4½
3035	Lenape G. & C	1	1	1	1
191225	Little Miami	2⅛	3 1/16	2⅛	2¼
125700	Little Nipissing	†17½	31	17½	21
22350	Mason Valley	2 1/16	2⅜	1 1/16	1⅜
76463	Mason Valley, new	9⅛	11⅜	6⅜	9¼
2856	Mason Valley rights	2½	2½	†30	30
248525	McKinley-Darragh	†82	145	75	131¼
7365	Mexican M. M. & S	3	4	3	4
698315	Miami Copper	28⅛	28⅞	16⅝	19⅛
100	Micmac Gold Min	⅜	⅜	⅜	⅜
474300	Mines Co. of Amer	†50	76	45	56
60860	Mines Co. of Am., new	5½	6¼	4½	5¾
78700	Montez. of C. R	†7	7	2½	2½
67144	Mont. Shoshone new	1 1/16	1 1/16	†10	14
6750	Montana Corbin	3¾	4	1⅝	1⅝
275733	Nevada Cons	27	27	18⅝	20⅛
48051	Nevada Hills	2 7/16	2 7/16	2	2¼
49375	Nevada Smelting	1	1 1/16	1/16	†15
358810	Nev.-Utah M. & S	1 3/16	1 1/16	⅛	⅜
1801	New Baltic Copper	13	13¼	3	7
225727	Nipissing Mines	10¼	11⅛	9⅜	10½
2374	North Butte Copper	43⅜	43⅜	19	35
718182	Ohio Copper	5⅜	6	1 5/16	1⅝
5000	Orphan Copper	⅛	¼	1/16	1/16
30800	Otisse	†23	23	3	3½
1000	Old Hundred	¼	¼	¼	¼
312010	Pacific Smelters	¼	½	1/16	⅛
32800	Pitts. Dick Creek	†60	150	25	25
139250	Precious Metals	1½	3	1	1½
3078100	Rawhide Coalition	†20	40	½	3½
652750	Rawhide Queen	†24	45	5	5½
1372600	Ray Central	3½	4 1/16	1¼	2 1/16
468034	Ray Cons	27	27½	15	18⅜
217600	Ray Cons. rights	†45	45	30	30
60422	Red Warrior M	2¼	3	1½	1½
1300	Sierra Cons	4½	4½	4½	4½
106650	Silver Leaf	†13	14	6½	6½
29700	Silver Queen	†25	35	11	35
50890	South Utah M. & M	4⅛	4¼	1	1
2600	Solida Cop	†62	70	66	70
8050	Standard Cons	†65	110	65	80
133580	Stewart Mining	⅞	1	½	¾
100	Superior & Boston	13¼	13¼	13¼	13¼
31574	Superior & Pitts	15	15⅜	8⅞	13⅜
35905	Tenabo M. & S	1⅞	3 1/16	1⅞	2
400	Tintic	⅜	⅜	¼	¼
18300	Tonopah Belmont	1.93	4 1/16	1.93	4⅛
147769	Tonopah Extension	†72	115	65	97
63837	Tonopah M. of Nev	7⅛	9¼	6½	7 1/16
788340	Tramps Cons	†4½	10	1¼	2
48170	Tri-Bullion	1	1⅛	1/16	⅛
640	Trinity Copper	9	9⅜	5½	5½
232800	Tularosa	1½	1 1/16	½	½
125348	Tuolumne Copper	3½	5 1/16	2	4½
473926	Union Mines	2	2¼	⅜	⅜
522650	Union Pacific Cobalt	†14	16	2	2
700	Utah Cons	38	38	33	33½
72230	United Copper	8½	9	4	4⅝
1475	United Copper pfd	25	30	18	18
221285	United Rico	†23	25	1	1
237040	W. Va. Wyom. Cop	2 1/16	3	1¼	2 1/16
116300	Yellow Jacket	†52	58	35	42½
220589	Yukon Gold	5	5	3½	3⅜

are given in the accompanying table; † means cents per share.

An effort has been made by the Curb brokers to exclude "wildcats," and to better the standard of Curb transactions generally. A certain amount of information is required about all stocks traded in. The tendency of the more substantial mining companies to seek the regular exchange still continues; arrangements are being made to list Ray and Chino regularly, and probably Miami will also take this step. The Curb has been greatly handicapped by the fact that it has no organization, chiefly owing to the New York Stock Exchange, which does not allow its members to transact business through any other organization. This opposition, it is understood, has been withdrawn, owing to the fact that the Curb in no way encroaches on the preserves of its "regular" neighbor, and that most of the Curb business is from the Stock Exchange brokers. It is reported now that steps are being taken to form a regular organization.

Excluding the sales of "rights" there were 10 stocks in which there was but one transaction during the year, all four high was from 150 to 200 per cent. of low, the averages were $7.39; $8.12; $4.56 and $5.61. Six of these closed the year at an advance over the opening. With 20 stocks in which high was 200 to 300 per cent. of low, the averages were $3.90; $5; $2.08 and $3.18, and five advanced during the year. Of 34 stocks in which high to low ranged from 300 per cent. up, the averages were $1.42, $1.59, $0.34 and $0.43, and only one rose during the year. The spectacular advance of 1910 was that of Tonopah-Belmont, following its rehabilitation as a mine.

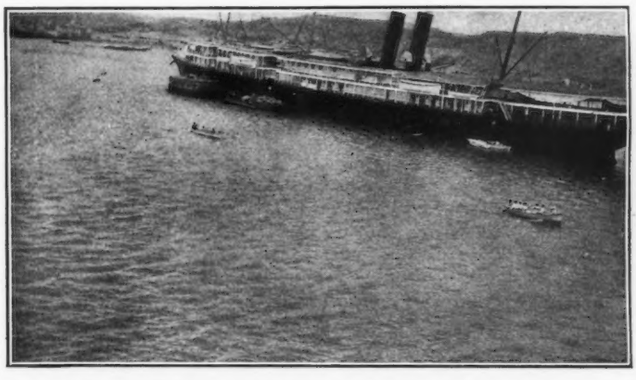
Transport Conditions in Bolivia

By George W. Dean *

Bolivia has no good harbor and is deficient in railroads. Development of the country held back by lack of transportation facilities.

*Mexican-American Smelting and Refining Company, Guaymas, Sonora, Mexico.

In a country which is not self-supporting and which imports from foreign markets many of the necessities as well as the luxuries of life, transportation plays an important role in the rapidity of its growth and development, and it is for this reason that many of the western South American republics are still undeveloped, although many of them are nearly as old nationally as the United States. This is particularly true of Bolivia, which, although established as a free republic in 1825, may be said to be still in the earliest stage of development. It is greatly handicapped by the lack of a sea coast, its present ports of entry being Mollendo, Peru, and Antofagasta, Chile, both of which are rather open roadsteads than harbors, as it is impossible to land freight or passengers in rough, stormy weather.



UNLOADING FREIGHT FROM COASTING STEAMER

MULES ARE USED FOR THE HEAVIEST MOUNTAIN TRANSPORT

LLAMA TRAIN NEAR LA PAZ, BOLIVIA

FERRYING PACK ANIMALS IN STRAW BOATS

ALL IMPORTS HAVE TO BE LIGHTERED AT PORT OF ENTRY

As most of the imports of the country are from European or coast ports, it is all handled in the same manner, viz: Delivered to the port by the foreign or coast steamers, received in lighters or launches, transported to land when weather permits, conveyed to the principal cities by rail, and then distributed by carts or pack trains of llamas or mules.

The principal lines of coasting vessels are the Compañia Sud-America de Vapores of Chili, and the Pacific Steam Navigation Company, or more properly, the Royal Mail Steam Packet Company, as this company has lately purchased all the vessels and holdings of the Pacific Steam Navigation Company. The last also operates a line of ships between Callao, Peru, Valparaiso, Chile and Liverpool, via the straits of Magellan. The average size of the coasting vessels is about 5000 tons.

These steamers call at all the coast ports and also Panama, delivering and collecting cargo. In all cases the cargo is received and discharged by means of launches, and the loss by breakage in rough weather and by careless handling amounts to a serious item.

Even in the harbor of Guyaquil, Ecuador, 30 miles from the sea, the cargo is handled by launches as this port is under perpetual quarantine and the vessels are not allowed to dock, but are compelled to anchor in the middle of the river, and receive and discharge their cargo by launches. The general type of launch in use on the west coast is a heavy double-ended open launch of 25 to 30 tons capacity, propelled by hand.

There being few good harbors on the coast, the facility with which cargo can be handled depends a great deal on the weather, which fortunately is usually fine. The launches are pulled with oars from land through the surf line to the ship's anchorage, unload and receive whatever freight there is to discharge, everything being hoisted out- and inboard by the ship's winches.

Consignments of live stock are handled in the same way. Horses are hoisted in a sling, and cattle usually by means of a rope sling around the horns, while many times passengers are hoisted aboard in a half barrel by the ship's winch.

American Packing Compares Poorly with European

The accompanying photograph shows the port of Mollendo on a comparatively fine day with the fleet of cargo launches at anchor outside the surf. Each launch as it is loaded, is anchored outside until time and weather will permit its removal to the mole and unloading. They are for the most part open, and during a storm many are lost with their contents. It is impossible to obtain insurance on goods on board launches, and in every case the loss falls on the consignee. It is in the handling of freight by the launches that American packing shows to disadvantage. In rough weather, it is not at all unusual for a case to slip out of the sling and fall 10 to 20 ft., landing in the bottom of the launch or on other boxes and packing cases, and not infrequently in the water, and unless the packing has been done exceptionally well, the result may be imagined. The English and German methods of making cases holding from 100 to 250 lb., thoroughly strapped with iron and sewn in burlap, usually results in delivering their goods in good condition, and this is one of the prominent reasons why the United States has so small a representation in the trade of the west South American republics. When weather permits, the launches are brought alongside of a mole and the cargo landed by means of a steam crane and forwarded by rail.

Imports via Mollendo are carried by the Peruvian Southern Railroad to Puno, the Peruvian port on Lake Titicaca, transferred to the lake steamers and carried across the lake, a distance of 116 miles, to Guaqui, the Bolivian port of entry, whence they are delivered by the Guaqui-La Paz Railroad to Viacha or La Paz. Imports via Antofagasta are delivered to Oruro, Bolivia, by the Antofagasta-Oruro Railroad, and there transhipped to the Bolivian Railroad for delivery to La Paz or Viacha, as the cars are not interchangeable on account of the different gages of the roads. In the cities, the distribution is made by carts or *cargadores,* and it is from here that the real difficulties begin.

Pack Trains Much Used

While many of the larger mines have railroad branches at or near their property, and other have a good road for hauling in carts, the greater part of the supplies and material for the interior must be distributed by mule or llama pack trains.

The trails are, for the most part, narrow and rough, and the accompanying photograph well illustrates the class of country and some of the difficulties which have to be overcome in the building of trails. The inclination of the hill shown, is 58 deg. and there are 24 zigzags in the trail ascending a distance of about 2000 ft. Many places the trails are blasted out of solid rock and are necessarily narrow and rough, which renders the transportation of heavy or bulky packages hazardous, yet it is over these trails that the miner must ship his ore and bring in his machinery.

Carefully Sectionalized Machinery Necessary

The size and weight of his machines or parts must be limited to the carrying capacity of a mule. In some instances dynamos, and crushing rings for Huntington mills weighing up to 500 lb. have been transported a distance of 130 miles over the mountains, but the cost, delays and difficulties must be experienced to be properly appreciated. Heavy timbers and long lumber must be dragged to its destination and are only made use of when necessity compels, concrete and stone work taking their place as far as possible. In at least one instance, a large piano was carried from La Paz into the department of Beni, a distance of about 300 miles by relays of six Indians each, the time being over three months. This method is sometimes employed with heavy or bulky machinery where it is impossible to load it on a pack mule or for stiff wire cables, which cannot be conveniently rolled into small coils. This method was made use of by the Olla de Oro Gold Mine Company to bring in the standards of a pneumatic stamp weighing about 700 lb. each.

The Wet Season Also a Bar to Transportation

During the rainy season which extends from November to March, many of the trails are obstructed by snow in the high passes, and by high water in the valleys, as there are few streams which have bridges. In many places, especially along the Desaguadero river, the pack

Handling Freight at Mollendo, a Peruvian Port of Entry for Bolivia

trains are ferried over in straw boats or *balsas*. The animals are thrown, their feet tied, and are placed upon the *balsas*, which are paddled or poled to the other side of the stream, where the animals are loosened, reloaded, and continue their journey. The larger mines have regular contractors or "arrieros," who operate pack trains of their own and handle the output of the mine and the supplies for the work at a stated price, and by giving return cargo are able to cut the cost to a minimum, but the operator who is installing a plant or who has not enough cargo for a continuous service, is often obliged to buy his own animals or pay extortionate prices for the transportation of his cargo. The prices vary from about $2 per quintal (100 lb.) for a trip of 130 miles, to $4 per quintal for a trip of 50 miles. Large packages or those requiring special care usually take double the regular rate. The usual cargo for the mule is 300 lb. and half as much for a burro, while the distance made varies from 15 to 25 miles per day, depending on the roads.

Two Years to Move a Dredge 200 Miles

The Incahuari Gold Dredging Company has been over a year transporting a 400-ton dredge a distance of about 200 miles to a river in the interior and estimates that it will be at least another year before the dredge will be in operation, although it has its own pack train of 150 mules and also hires such arrieros as care to take a contract. Feed for animals forms a very important item in the cost of mountain transportation, and in years of drouth and short crops, as in the last year, the cost of straw barley, their principal feed, rises to $3 to $4 per quintal.

There are many trails which were built and maintained by the Incas and Spaniards, but many of these have fallen into disuse and the remainder are now in worse state than when they were left by the Spaniards in 1780. Although Bolivia has liberal laws concerning the construction and maintenance of roads and requires a road tax from the people, it is not rigidly enforced and the miner is practically forced to build and maintain his own road. This has held back the development of the country, for before the prospector can use anything in the development of his property, which cannot be carried on a man's back, he has to build a trail, and this is beyond the means of the ordinary prospector, and there are few prospects indeed, which would warrant such an expenditure.

Spaniards Used Man-back Transportation

That the Spaniards did much of their packing upon the backs of Indians is abundantly proved by the general inaccessibility of many of their old trails, sometimes passing along the face of a precipice on a narrow shelf where it would be absolutely impossible to take an animal, and in other places over chasms or high passes by a series of stone steps, which would be impassible to a cargo animal. Their long trails passing from one part of the country to another were undoubtedly for pack trains from their easy grades and their width, but apparently all the ore they removed from their mines, which often amounted to thousands of tons, was taken on the backs of Indians to the place where it was milled, as in many cases the trails are simply a flight of stone steps.

But Little of Country Accessible by Railroad

It is only a comparatively small part of Bolivia which has been opened up by the present railroads, and the great natural and agricultural resources of the country are still inaccessible, except by means of a few mountain trails and navigable tributaries of the Amazon and other large rivers. The last Congress granted a concession for a railroad between the head of navigation on the Pilcamayo river and Cochabamba, which will pass through the department of Santa Cruz and will open a country rich in oil, coal, timber and agriculture, affording an outlet to Buenos Aires on the east and the high pampas on the west.

A railroad between Arica, on the coasts of Chile and La Paz, is now under construction with about 120 km. to complete, which will place La Paz in direct connection with a good port and with a single all-rail haul of 24 hours, without the present transfers of freight. There is also a railroad projected between La Paz and the head of navigation on the Madre de Dios river and other tributaries of the Amazon, which, when completed, will open up rich rubber lands, timber and agricultural lands.

The cost of freight from Bolivia to the sea coast at present amounts to as much, and often more than the freight to New York or Liverpool from the port, and this, added to the transportation to the railroad by means of pack animals, leaves but little margin for the miner unless he has exceptionally rich ores to work and prohibits the transportation of crude material. Through the main cordillera, a railroad could only be built at an enormous cost, and although it would open up a virgin country rich in all natural resources, it is doubtful if sufficient business could be obtained to warrant the expenditure unless the region were controlled by foreign capital, as the natives are not especially industrious and the Indians are satisfied with the barest necessities of life.

Nevertheless, it is only rail communication between the great fertile agricultural and timber lands of the interior departments of Santa Cruz and Beni and the high pampas and mining regions, that will render the country self-supporting and place it in a position to profit by its great natural wealth.

Largest Gyratory Breaker in the World

The largest ore crusher ever built was recently shipped to the Biwabik mine, Biwabik, Minn. It stands 28 ft. high and weighs over 500,000 lb. The two receiving openings are each 48x108 in. and will take pieces of rock weighing 10 tons. The crusher is expected to produce a 40-car train load of crushed rock per hour—from 1000 to 1200 tons per hour crushed to 5-in. ring.

The Biwabik Mining Company has extensive iron-ore properties which have been developed on the openpit system. This permits the open blasting of the ore, which comes loose in large pieces that can be loaded on cars by steam shovel. Most of the ore is mineralized taconite, one of the hardest of iron ores.

To handle this ore the Biwabik Mining Company, in 1901, installed the largest and most powerful breaker that had been built up to that time. This breaker has been in service since that time. The enlargement and extension of the company's work, however, has reached such proportions that the old breaker is no longer capable of handling the ore. The old breaker was built by Allis-Chalmers Company, which also built the new one. It is known as a No. 24 and is the largest ever built by any concern.

Improved Lap-Welded Pipe

The American Spiral Pipe Works, of Chicago, is now making lap-welded pipe in large sizes from open-hearth flange steel of 60,000 lb. tensile strength, in which the weld is practically of equal strength with the pipe. The pipe runs from 12 to 72 in. in diameter and is annealed after welding. Tests from welded portions showed tensile strengths of 62,520 lb., 61,070 lb., 63,700 lb., and 56,100 lb. per sq.in. respectively, while a test bar from the unwelded portion showed 60,370 lb. per sq.in. tensile strength.

On testing a 24-in. pipe for fatigue of metals, the pressure was brought nine times to between 900 and 1100 lb. per sq.in. The pipe was stretched to 25¼ in. internal diameter, but remained sound. On the tenth test the pipe fractured, the strain being then over 55,000 lb. per sq.in. A 20-in. pipe was tested for resistance to end pressure. At 565,000 lb. it folded but the weld remained tight. The pipe is recommended by the makers for high-pressure hydraulic and condenser lines.

A hospital for miners has been established at Zacualpan, State of Mexico, by the mine owners of that district.

Cyanide Treatment of Concentrates

By A. B. Parsons *

Description of process used at Goldfield, Nev. Concentrates are given preliminary acid treatment, then made slightly alkaline and agitated in cyanide solution in a Pachuca tank.

*Tonopah Liberty Mining Company, Tonopah, Nev.

The Goldfield Consolidated Mines Company, Goldfield, Nev., was confronted at the time it was preparing to start the 100-stamp mill with the problem of disposing of the high-grade pyritic concentrates from the Deister slime tables. A plan was evolved and a special plant built to cyanide the concentrates and remove the bulk of the gold content before shipment, with a view to avoiding the almost prohibitive freight rates on high-grade material. Improvements have been made from time to time so that the treatment at present is so successful that a large proportion of the residues are too low for profitable marketing and are placed on the dump.

Some Gold Amalgamated

The difficulties encountered in the treatment are both chemical and mechanical. Of the material coming from the Deister slime concentrators, 80 per cent. passes a 200-mesh screen; the silica content varies according to the closeness of concentration, but averages about 40 per cent., the bulk of the remainder of course being pyrite; and, in addition, there are the complex compounds of copper, bismuth, antimony, tellurium and sulphur, with which the gold is associated. After leaving the Deisters the concentrates are amalgamated, 15 to 20 per cent. being recovered on the plates. There is a wide variation in the grade of the material passing off the plates, but the average is less than 20 oz. of gold per ton: the silver is comparatively negligible. The equipment of the plant comprises five Pachuca agitating tanks, three collecting tanks and two clarifying tanks.

Acid Treatment Before Agitation

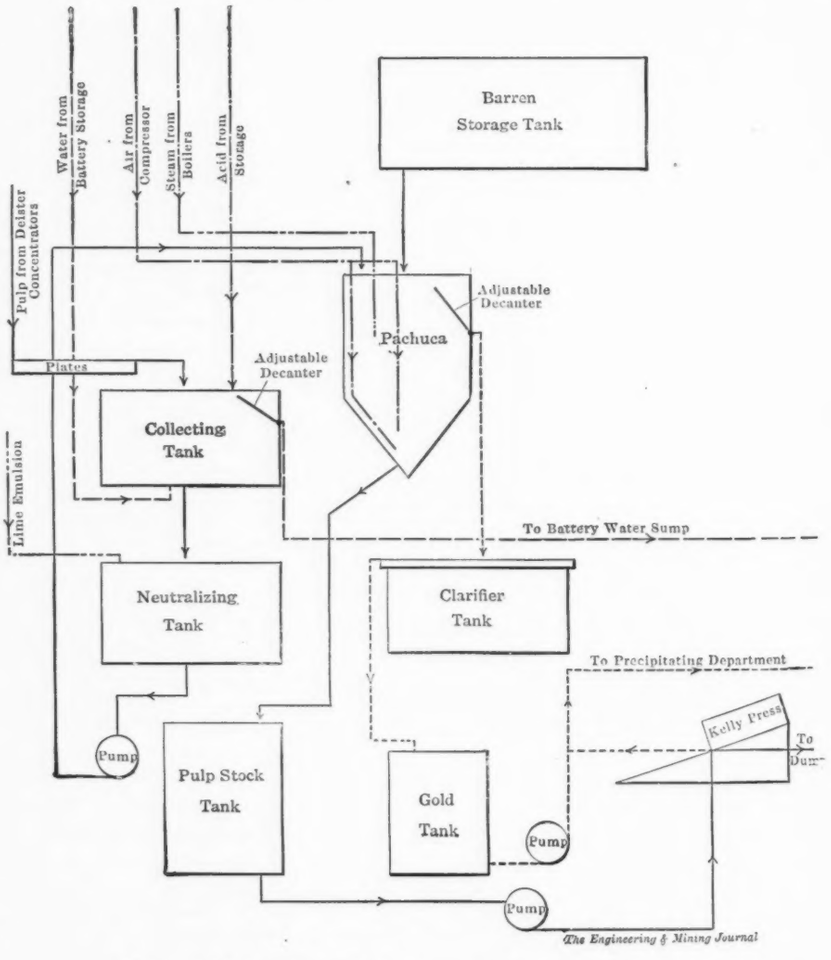
The first operation in the treatment of the concentrates and an interesting feature from a chemical standpoint is an acid treatment preliminary to the treatment with cyanide solution. This is accomplished in the wooden collecting and watering tanks which receive the pulp through a distributing launder from the amalgamating plates. The excess water is decanted off until 40 to 50 tons of settled concentrates, representing 24 hours' run, and 30 tons of water remain in the tank, then 1000 lb. of commercial sulphuric acid is gradually added as soon as the charge is in thorough agitation. At the end of 10 hours, 55 tons of water under high pressure is run in at the bottom of the tank and agitation stopped. The charge settles in a couple of hours and the wash is decanted. Two similar washes are supplied and decanted to remove as far as possible the soluble salts and any remaining acid. The purpose of the treatment is primarily to dispose of the basic ferric sulphate and avoid the resultant formation of ferro- and ferricyanides with excessive consumption of cyanide.

After the final decantation of wash water the charge is "dropped" by gravity to a neutralizing tank, where a sufficient quantity of a thin emulsion of lime is added to make it slightly but distinctly alkaline. Continuous agitation is maintained until ready to transfer the charge to a Pachuca tank.

Agitation and Decanting Both Effected in Pachuca Agitator

The actual cyanide treatment in the Pachuca tank consists of a series of eight-hour periods of agitation. An interval of four hours is allowed for settling the charge, decanting the pregnant solution, and refilling with strong barren solution. The idea of settling and decanting in the Pachuca itself was developed several months after the plant was put in operation. It was originally necessary to discharge the pulp to a Dorr thickener and afterward pump it back to the agitator to be again built up. This transfer, however, proved a source of continued trouble. On the other hand the present plan is exceedingly simple, gives equally good results, and is considered one of the best features of the treatment.

In building up a new charge 250 lb. of cyanide and 20 lb. of lead acetate are first dissolved in 10 tons of barren solution containing about 4.5 lb. of cyanide to the ton. This gives a solution of nearly 30-lb. strength into which the



CYANIDE TREATMENT OF CONCENTRATES AT GOLDFIELD, NEV.

neutralized pulp is pumped. Additional barren solution is finally added to fill the tank within about three feet of the top. This method of procedure has been found much more effective than diluting the solution first and then pumping in the pulp, the very strong solution presumably attacking the gold more rapidly at the outset. When finally made up, the charge contains approximately 45 tons of dry concentrates and 70 tons of solution. Agitation is commenced as soon as the pulp enters the tank, and in the course of an hour a sample of filtered solution is titrated for cyanide and protective alkalinity. Sufficient cyanide and lime emulsion are added to maintain 4.5 and 0.5 standards respectively, the latter in terms of CaO. For the first four subsequent agitations 10 lb. of acetate are used and for the remainder only 5 lb. for the reaction of solution, as to oxidize the reducing agents which have accumulated in the solution and thus renew the activity of the cyanide. It should be noted that all cyanide, lead acetate and sodium peroxide are introduced, in dry form, directly into the Pachucas.

The curves show a remarkably high percentage of extraction during the first eight hours, with a fairly uniform increase until the ninth, when the curves become almost horizontal. The original scheme was to complete the treatment with the fifth agitation, but the number of Pachucas was increased from three to five, giving capacity for the present treatment.

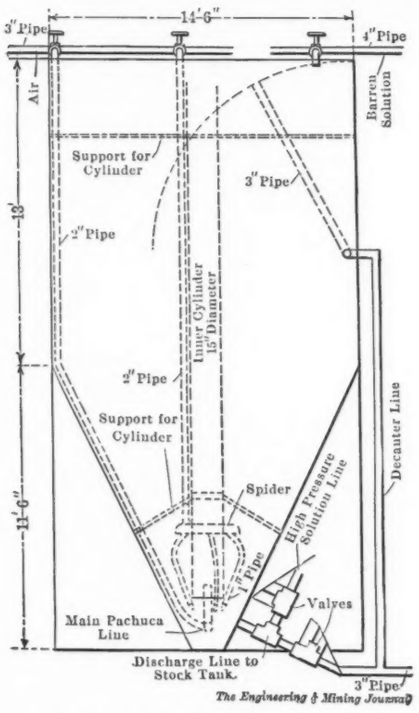
After the final solution has been decanted the charge is dropped to the Kelly-fiilter stock tank, where agitation is maintained and some slight increase in

TABLE SHOWING EXTRACTION AFTER VARIOUS PERIODS OF AGITATION.

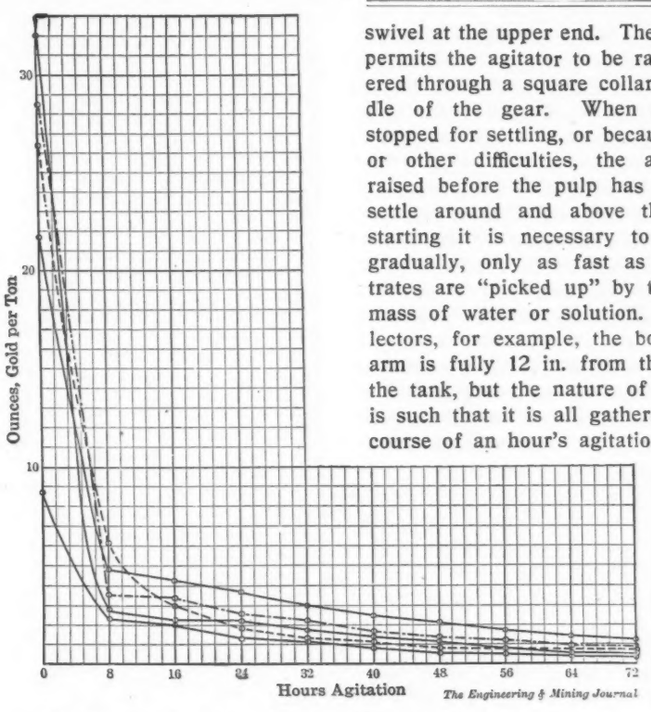
FIGURES ARE OUNCES GOLD PER TON OF PULP.

Charge.....	436	441	468	505	510
Heads.....	8.70	28.50	26.30	21.70	32.00
After 8 hours....	2.32	3.48	6.04	4.80	2.88
After 16 hours....	2.00	3.40	3.0	4.32	2.32
After 24 hours....	1.32	2.48	1.94	3.76	2.20
After 32 hours....	1.12	2.20	1.32	3.00	1.70
After 40 hours....	0.84	1.58	1.10	2.52	1.38
After 48 hours....	0.56	1.22	0.80	2.08	1.10
After 56 hours....	0.56	1.12	0.80	1.70	0.76
After 64 hours....	0.50	0.84	....	1.38	0.56
After 72 hours....	0.46	0.78	0.66	1.20	0.56

swivel at the upper end. The chain block permits the agitator to be raised or lowered through a square collar in the middle of the gear. When agitation is stopped for settling, or because of power or other difficulties, the agitators are raised before the pulp has had time to settle around and above the arm. In starting it is necessary to lower very gradually, only as fast as the concentrates are "picked up" by the revolving mass of water or solution. In the collectors, for example, the bottom of the arm is fully 12 in. from the bottom of the tank, but the nature of the material is such that it is all gathered up in the course of an hour's agitation.



ARRANGEMENT OF PACHUCA TANK



EXTRACTION CURVES—CYANIDING GOLDFIELD CONCENTRATES

The amount of cyanide added each time of course depends upon the titration made at the time agitation was last stopped, but it generally requires from 25 to 50 lb. The clear decanted solution amounting each time to about 40 tons, is run through one of two steel rim-overflow clarifiers to the gold tank from which it is pumped to the precipitating department.

OXYGEN INTRODUCED TO OXIDIZE REDUCING AGENTS

At the end of the fourth hour of each agitation period a 10-lb. can of sodium peroxide is opened and immersed in the tank at the end of an eight-foot pole, introducing oxygen well in the center of the charge. The addition of this oxygen is not so much to supply the element extraction obtained before the filtered pulp is ready for discharge from the press. The Kelly is peculiarly adapted to the work of filtering the heavy slimes and handles the daily output in about 12 hours, allowing 45 min. for a cycle. The cake is made in from 2 to 5 min., depending upon the condition of the leaves; is washed 5 min. with barren solution; and is finally dried with compressed air until the residue contains from 12 to 15 per cent. moisture.

PACKING OF SLIMES CAUSES TROUBLE

The tendency of the finely crushed particles of high specific gravity to pack so compactly and cohesively has given rise to difficulty in the mechanical handling. Several schemes have been tried to effect mechanical agitation in the collecting, neutralizing and stock tanks. The most successful agitator, and the one now in use, consists of a plain wooden arm attached to the lower end of a square 3-in. steel shaft. The shaft is revolved by means of a beveled gear and pinion, and is supported from the roof by means of a chain block attached to a

The agitating tanks are of the same diameter, have the same conical bottom but are little more than half as high as the regular slime Pachucas. When ready to resume agitation of a settled and decanted charge it is necessary thoroughly to loosen the tightly packed material at the bottom of the cone before the pulp can be made to rise through the central cylinder. This is accomplished by means of the "spider," a set of four 1-in. compressed-air pipes arranged around the lower end of the cylinder and pointing toward the apex of the cone. The arrangement is illustrated in Fig. 3. If these pipes become choked, auxiliary pipes attached to hose are used. The ends of the spider pipes as well as of the main 2-in. Pachuca air pipes are plugged and a number of ⅜-in. holes cut in the

sides. A short piece of soft rubber tubing, wired at the upper end, covers these holes, permitting the air to escape when the pressure (about 35 lb.) is turned on, but preventing the pulp from entering the pipe during the settling period. In spite of this arrangement the pipes are often choked and a union is provided several feet from the end so that the lines can be cleared out and new fittings put on when the tank is empty. At the bottoms of all the tanks high-pressure solution, water and air lines are connected through appropriate valves so that the pulp may be loosened around the discharge opening when a tank is to be emptied.

While exact figures on costs are not available it is admitted that they are but a small proportion of what the marketing costs would be. The largest cost factor in the plant itself is, of course, that for chemicals, including peroxide, cyanide, acid, acetate, etc. One solution man on each shift handles the entire plant with the exception of the Kelly press, which requires an operator and a helper 12 hours per day; the labor charge therefore is not high. A single 50-h.p. motor operates all of the agitators and a number of small-power motors are required for the various pumps. Air for agitating and steam for heating the solution in winter are both supplied from the main mill, and the concentrate-treatment plant and the mill proper have precipitating and refining departments in common. A proportion of these costs are of course chargeable against concentrate treatment. I am indebted to J. W. Hutchinson, mill superintendent, and to S. J. Kidder, formerly assistant superintendent, for their courtesy in giving information for this article.

Skidoo Mines Company

The management of the Skidoo Mines Company, operating a gold mine in the Panamint range, Inyo county, California, presents some interesting figures regarding recent operations and work done during 1910. The report for December, 1910, shows the following: Tons of ore milled, 1155; time lost, 10¾ days; value bullion produced, $19,517; value concentrates (estimated), $375; total, $19,892. Costs: Development, $817; operation, $7515; total $8332. Net profit for month, $11,560. The cleanup for the first half of January, 1911, amounted to $7500. During this period there was uncovered in the mine, on the 200 level, a 2½-ft. vein that averages $25 per ton in gold. During 1910 there were 295 ft. driven in raises and 1285 ft. in drifts.

The report covering the operation of the cyanide plant from March 28 to Nov. 15, 1910, shows the following: Tonnage delivered to mill (dry), 8280; average value per ton, $4.12; less in slimes, 27.5 per cent.; extraction, 83 per cent.; average value of tailings, 69c. per ton; total proceeds, $20,649. Costs: Material, $2554; smelter, express and stage, $864; labor, $4793; total, $8212. This shows a net profit on the 8280 tons (9190 tons wet) of $12,437. The costs are further summarized, as follows, the figures being given in cents per ton: Cyanide, 23.1; lime, 3.4; zinc, 7.2; acid, 1.6; caustic soda, 0.4; distillate, 4.3; gasolene, 0.9; coal oil, 0.8; oil, waste, 0.9; Selby loss charge, 8.3; Selby treatment charge, 3.7; expressage, 1.7; stage charge, 0.6; solution and tank men, 73; assaying, 4; repairs, 2.7; total costs, 136.6, or $1.366 per ton.

The Ingersoll Drill and Cameron Pump Historically Considered

By W. L. Saunders*

It was in a little shop on the corner of Second avenue and Twenty-second street, New York, that both the Ingersoll drill and the Cameron pump originated; the manufacture of both began under the same roof. The late Henry C. Sergeant, who is admitted to have done more in the invention and development of the rock drill than any other person, designed the first really successful Ingersoll drill, getting his fundamental ideas of the valve motion from A. S. Cameron. This was at a time when the flywheel engine was more or less of a novelty and a reciprocating engine, like a pump or a rock drill, with no crank shaft to carry it around the center, was practically unknown. The first machines of this class were built on steam-engine lines, the valve itself being mechanically connected with the piston. In the first Ingersoll drill, as in the first pump, when the piston reached the end of the stroke it reversed the valve by direct mechanical contact with knuckle joints, rods or other devices, which intervened between the piston and the valve.

Invention of the Tappet Valve

A. S. Cameron was seeking to perfect a pump which could be used in rough places where exposed parts were liable to wear and injury. He also wanted to make a valve which would open a large port at the end of the stroke the instant that the piston reached a certain point. This was hardly practicable with a mechanically moved valve without excessive shock and wear. Cameron's invention, therefore, was to place a small tappet or knuckle in each cylinder head of the pump, which should serve as a trigger to trip and open, through contact with the piston, a small port connecting either end of the valve. The valve itself was submerged in live steam, pressure being equal on both ends, hence when this tripping action took place it reduced the pressure on one end so that the greater pressure on the other caused it to reverse. In order to do this with the minimum shock at the tappet, and also taking into consideration the importance of having a small port controlled by such action, Cameron used a plunger piston, which in turn overlapped the valve itself, this plunger piston having an area on each end, which might be more or less, according to the resistance of the valve to the action of sliding on its seat. The valve itself was, and still is, a slide valve, which, as is well known, rests tightly upon its ports and does not leak through wear.

Sergeant Adapts the Valve for Rock Drill Use

Sergeant had a more difficult problem than Cameron, because the speed of a pump is only about 100 ft. per min., while that of a rock drill is four times as great. This high speed made it difficult to use any kind of a tappet trigger, and in order to get the quickest action of the valve Sergeant sought to use the plunger, or valve-moving device of Cameron as the valve itself. In doing this he encountered another difficulty, the valve, in order to be tight on its seat would press so hard that the speed of the drill became sluggish, so he ran a bolt through the center of this valve to relieve it of a certain portion of the pressure. Instead of the tappet trigger Sergeant moved his valve by causing the piston of the drill to undercover passages leading to each valve end. Here we have the identical principle, so far as valve movement is concerned, that is embodied in the Cameron pump, namely, an equal pressure on both ends of the valve and the valve moving through a disturbance of that pressure on one end and the other alternately, the action itself being controlled by the strokes of the piston. No better evidence is needed of the success of this valve action than the fact that the Ingersoll Eclipse drill and the Cameron pump are at work today with valves of this construction.

The community of interests between Cameron and Ingersoll has extended from this inception to the present day. The castings for the first air compressors of the Ingersoll make were made in the Cameron foundry on East Twenty-second street. For many years, and until the Ingersoll works were moved to Easton, Penn., castings were made by Cameron.

*President of the Ingersoll-Rand Company, 11 Broadway, New York, N. Y.

The American Detinning Company has completed its plant at Connellsville, Penn., and will begin to operate it early in February. The main building is 50x60 ft., two stories, with several smaller buildings for storage use. The plant has connections with the Baltimore & Ohio Railroad through a siding.

Texas Mining Laws and Prospecting

By Martin Fishback*

Texas mining laws are highly oppressive to the prospector and have retarded the State's mineral development. Arbitrary valuation of mineral lands the worst feature.

*Mining engineer, P. O. Box 701, El Paso, Texas.

The seasonable move now being made toward obtaining a revision and improvement of the Texas mining law is worthy of the support of every man who feels at all inclined to promote the welfare and progress of the State, no matter whether he be directly interested in mining or not. Someone said that "law is for the convenience and protection of the people, not for mere perfection of an instrument." But the Texas mining law as now prevailing possesses neither legal excellence nor protection, unless in its creation, protection was supposed to mean a solid barrier designed to prevent the development of the mineral resources of the State.

Prof. W. B. Phillips, director of the bureau of Economic Geology, University of Texas, has done more than any other one man, or any association of men, to remedy the evil in his efforts toward having the objectionable clauses in the present law repealed and changed; but so far without avail. Commencing this campaign several years ago, in an able address, issued in bulletin form by the University (*Bull.* No. 6, July, 1903) he clearly stated the shortcomings of the existing law, and suggested the remedies. He has kept at it ever since, but an indifferent or stupid Legislature has paid no attention to him.

Private Ownership of Alternate Sections a Stumbling Block

To quote from the bulletin mentioned: "The private ownership of every alternate section keeps out prospectors. It is expensive exploring for minerals, and when there is such uncertainty as to the exact location of public and private lands, this expense becomes doubled. I have known prospectors to spend months in the mountains, and after finding something really good, and having same surveyed, it was found to be on private land. As a general rule, private individuals offer small inducements to the miner, and the railroad companies owning most of the private surveys offer none at all." This condition is in itself sufficient to keep out the honest, hardy and intelligent prospector; but there is another yet better designed to keep him out, and that is, in addition to the unreasonable expense attached to the location of a mining claim, the final exorbitant price per acre demanded by the State before a complete title is given.

Miner Pays Anything from $25 Per Acre Up

In article 3498-*F*, of the present mining law, it prescribes that. "All mineral lands shall be sold at such price as may be fixed by the land commissioner, but in no event shall the same be sold at a price less than $25 per acre, nor until he has ascertained approximately their value; provided, that no person, firm or corporation or association of persons shall be permitted to locate or file on more than five claims of 21 acres within a radius of five miles." This article assures the prospector that he will have to pay a minimum of at least $25 per acre for his claim, and as much more as a wise land commissioner may determine the claim to be worth in a mineral way; in other words, if the prospector should discover a bonanza, which is the everlasting hope of every good prospector he is assured by law that the State may impose an impossible price for his find and location, and thus in fact take it away from him. Is it any wonder that the mineral resources of Texas are lying dormant?

To open up and develop the possible mineral wealth of Texas, the laws and regulations must be made such as to make the field an attraction to the prospector; a field where, if he find valuable lodes or deposits of mineral, he is not required by law to pay an exorbitant price for the land and where he knows his find and location will be protected; that is all the reward he asks for the hardships that belong to the prospector's work.

Protection to the Prospector Necessary for Development

One has only to glance at the enormous development that has taken place in Colorado, Utah, Arizona, Idaho, Nevada, California and Alaska to be convinced that in the search for and development of mineral wealth, liberal laws and protection for the prospector is the keynote for the development of mining districts. The Federal mining laws, supplemented by State and Territorial statutes and, to a great extent, still existing local rules in many mining districts, are a long way from being perfect, and mining societies have in recent years presented resolutions to Congress for revision and improvement; but notwithstanding all that it is extremely doubtful if more restricted and definite laws would have been so conducive to the mineral development of the western States; nay, more than that, it is highly probable that because of these laws, and local rules originally adopted by the prospectors themselves, this great development was made possible, and induced the intrepid explorer to go out into the wilds of the Rockies, fight Indians, cold and starvation, and untold sufferings from thirst and alkali dust in the deserts.

The prospector is the real pioneer of the west; he and his burro. After him came the engineers, the capitalists, the mine promoter, the homesteader, the real estate parasite, and all the rest of good and evil things which follow in the wake of a rich "strike" in a new country; and eventually there grew railroads, cities and towns, fruitful farms and profitable stock ranches. But the prospector does not get the credit he is justly entitled to as the advance agent of civilization. Those who have never been on a real prospecting trip in the Rockies or Sierras; who have never crossed Death valley, for instance, walking day after day with a parched throat, spitting out the alkali dust, with the reflection of a blazing sun on glaring surface burning the eyes out of their heads, hundreds of miles from the nearest settlement, have not the least conception of the nerve, courage and fortitude it requires; those who have are the sort of men who are responsible for and made possible the present prosperity of the western States lying between the foothills of the Rockies and the Pacific slope. Prospecting in Mexico, where there have been native settlements throughout the Sierra Madre for several hundred years, is a Sunday picnic compared with the hardships of the western prospector of 50 or even 25 years ago. The writer has spent the best part of 20 years in the mining fields, from Montana to Guatemala, and feels qualified to make this assertion. And, if the State of Texas would establish its mining laws on a basis that would appeal to this class of men it would be equivalent to an invitation and the beneficial result would soon make itself known.

Location Formerly a Rough-and-ready Process

Nearly all of the richest mining districts of the West were discovered and prospering long before the Government had subdivided the country; the prospector, when he found and located a claim, was not and could not reasonably be expected to be an astronomer, a navigator or a civil engineer, or to establish the longitude and latitude of a place where man had never set foot before; all that he was required to do was to state the general direction of the strike

of his vein, scribbled on a blazed tree near the discovery, or on a board knocked off an empty powder box and fastened to a stake near the regulation 10-ft. hole, and put up some corner stakes. A certificate to that effect, which also embraced a rough description of the surrounding country, was filed at the nearest recording office when convenient, often several months later, and the title to the claim was established and continued in force so long as the annual assessment work was performed.

This rule prevailed, to the writer's knowledge, in some districts in Colorado less than 20 years ago. In one case the U. S. Supreme Court decided that if a prospector has discovered "float" or other indications of the immediate presence of a vein and keeps diligently at work, such incomplete discovery is equivalent to discovery of the vein in place. If it did not go so far as to decide that the prospector could at once locate upon such indications, it did decide that he has not only the right to be protected in his possession while following up such indications, but that he will be protected to the extent of a full claim when his location is complete.

Abuses Possible under the Present Law

Although it is certain that the liberal mining laws of the United States have made possible this wonderful development of the western States, it is also true that, as the country became settled and "civilized," the subdivision of Government land progressed, and the frontiers gradually disappeared. In recent years this limitless opportunity for the prospector has been abused, not by the class of prospectors previously referred to, but by a class of individuals who may be classified as the dog-in-the-manger type who, because the law made it so easy to hold a claim, are now to be found in every camp fostering a retardation of development.

The extralateral and apex right which was originally designed for the protection of the prospector, has become a fruitful source of endless and intricate legal snarls, costing immense sums of money; most of these litigations, however, occurred after the prospector had sold out and the purchasing company had developed a "bonanza;" some adjoining company would start the trouble and the legal battle was on. Hundreds of lawyers in the West have become wealthy by "specializing" in mining law.

Undoubtedly this liberal mining law has served its usefulness and does itself need revision to fit present needs and conditions; but there certainly must be a golden course to pursue to bring the prospector and the undeveloped mineralized sections of western Texas together.

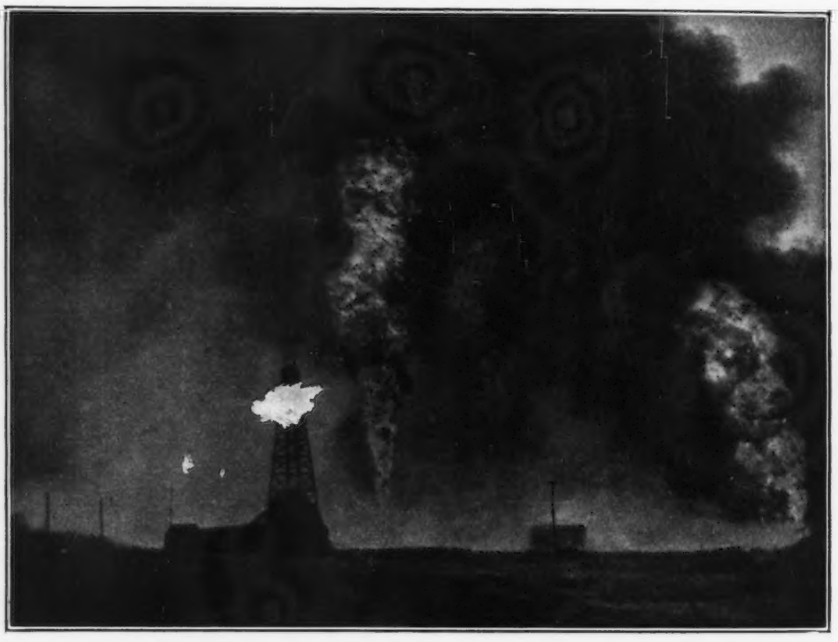
The mining law of Mexico today is a piece of legal art and perfection, but it is not a poor man's law; the mining law of Canada is in many respects better and more favorable to the prospector; the mining law of the Philippine islands is, on the whole, superior to any of them. But it is not necessary to copy anything from any of them; common sense is the best yard-stick; the test of value is the use made of it. Persuade the Texas lawmakers to pass a mining law that will induce the prospector to come, a law that is simple and convincing and strong in protection; give the prospector a chance to scour the hills without imposing upon him the necessity of being a capitalist; offer him an opportunity to dig down on his vein or deposit of ore and perhaps take out enough money to pay a reasonable price for a clear title, or at least to make a showing sufficient to enlist financial assistance. Once the prospector is interested and "makes good," the appearance on the scene of the mining engineer and capitalist will be a natural consequence, and the mining industry in Texas will become a reality.

A Flaming Oil Gusher

Los Angeles Correspondence

The accompanying illustration is from a photograph of well No. 56 (center) of the American Oilfields Company, and a well on adjoining property belonging to the Santa Fe railroad, situated in section 36, Midway field, Kern county, Cal. On Sept. 11, 1910, while gushing at the rate of 2000 bbl. per day, well No. 56 in some way became ignited and soon communicated the flames to the Santa Fé well a short distance away. For a while it was feared that a conflagration involving the loss of many thousands of dollars was imminent, but after burning fiercely for two hours both wells filled with sand and the flames died out for want of fuel.

Well No. 56 was completed July 11, 1910, at a depth of 1988 ft., and on July 18 began flowing at a rate of 300 bbl. per day. On Sept. 6 it was flowing 200 bbl. per day, but Sept. 7 it made a record of 15,000 bbl., dropping back to 1000 bbl. the next day. After the fire the well remained choked until Oct. 8, when it made a record of 10,000 bbl., this rate of flow gradually decreased and the well is at present producing 500 bbl. per day. Well No. 79 of the American Oilfields Company, that began producing May, 1910, and flowed for a while at the rate of 50,000 bbl., is now making 500 bbl. per day.



Oil Gushers Afire in Midway Field, California

Cadmium

Paul Speier, of Breslau, reports that in 1910 the price of cadmium moved between 475 and 525 marks per 100 kg., the year closing with an exceptionally strong demand for spot as well as for future delivery. Consequently, prices took an upward direction, and for metal warranted to contain 99 per cent. Cd. from 575 to 600 marks is now being asked per 100 kg. The United States, which frequently appears as seller in the German market, during the last few weeks has bought several large lots in that market.

Maine has joined the list of steel-making States. The Portland Iron and Steel Company, at Portland, began the erection of a 25-ton basic open-hearth furnace in 1909 and completed it in April, 1910. Steel merchant bars and bars for reinforced concrete work are rolled.

The Humphrey System of Pumping

The Humphrey system of pumping may be briefly described as a method of raising a liquid by applying the energy of expansion of an ignited combustible mixture to one end of a column of the liquid, so as to propel the column along a discharge pipe, and to cause it to oscillate in the pipe under such conditions of energy of the moving liquid that everything necessary for preparing for the next ignition is performed during one or more oscillations.

The energy of expansion of an ignited combustible acting directly on a column of liquid is the basis of a new method of pumping.

NOTE—Abstract from a series of articles in *Power*, Dec. 13, Dec. 20, 1910, and Jan. 5, 1911.

THE SIMPLE FORM OF THE PUMP

Fig. 1 shows the pump in its simplest form. Water is to be raised from a supply tank *S* to an elevated tank *R*. *C* is the combustion chamber, *W* the water-valve box with valves *V* opening inward and *D* the discharge pipe. *A* and *E* are, respectively, inlet and exhaust valves connected by a simple interlocking gear. The cycle of operations is as follows: A charge of gas and air compressed in the top of *C* with all the valves closed, is fired by a sparking plug in the top casing. The pressure of the expanding gases sets the whole column of water in *D* in motion and this water attains a momentum so great that it continues to flow after the pressure of the gases has been reduced to that of the atmosphere.

At this point the exhaust valve *E* opens by its own weight, and water is admitted through the valves *V*, mostly to follow the moving column in *D*, but partly to rise in chamber *C* in an effort to reach the level of the water surface in *S*. When the water column has expended its energy, it flows back toward the pump, gaining velocity until it reaches the exhaust valve *E*, which it closes by impact. The energy of the moving column is expended in compressing the burnt gases imprisoned in the cushion space *F* to a pressure greater than that due to the static head in *R*. The water moves outward a second time; when it reaches the level of the valve *E* the pressure in *F* is again atmospheric. Further movements of the water open valve *A* against a light spring and draws in a fresh charge of gas and air. Once more the column of water returns under the elevated-tank pressure and compresses the charge of gas and air, which is then ignited to start a fresh cycle of operations.

The action of the pump is not altered if, instead of delivering into an elevated tank, it discharges into an air vessel or into an open standpipe or tower. The fact that in the Humphrey pump the burnt gases are so well cooled at the end of the long expansion stroke that they will not ignite an incoming combustible charge, makes it possible to have a two-cycle pump.

THE DOUBLE-BARREL PUMP

The left-hand portion of Fig. 3 illustrates the double-barrel pump, the cycle of which may be readily surmised. Explosion occurs alternately in the two combustion chambers *A* and *B*, and in each chamber there is the usual cycle of compression, explosion, exhaust and the taking in of a new charge, thus again involving four strokes of unequal length. In this case, the water column has only one outward and one inward movement per cycle, but the expression "two-stroke" could be applied only to the water column, and not to what occurs in the combustion chambers.

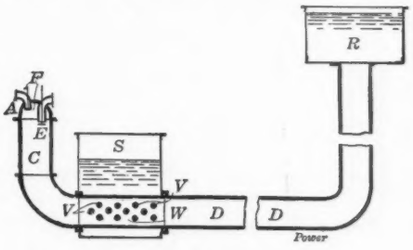


FIG. 1. THE SIMPLE PUMP

The action of this pump differs from that of the simple pump in that the new charge is taken merely by water falling under the action of gravity, and does not depend upon compression and expansion of an elastic cushion; hence, the clearance spaces at the tops of the combustion chambers may be reduced to the very small volume needed to bring easily to rest that portion only for the column which rises in the chamber, the main body of the column being brought to rest by the compression of the new charge. The advantages of the two-barrel over the simplest of the single-barrel pumps are three: higher explosion pressure for the same water lift, due to increased purity of the charge caused by the decrease in clearance space and to the higher compression pressure; increase of the number of cycles possible in unit time, and greater output for a given total weight of pump and pipe.

Five types of single- and double-barrel suction-lift pumps are described by Mr. Humphrey, one of which is illustrated in Fig. 3. On explosion in *A* the water column moves outwardly from the chambers and compresses the air in *C* until the pressure is sufficient to lift valve *N* and pass water into the high-level tank. On the column coming to rest, valve *N* shuts and the compressed air in *C* expands again, imparting velocity to the column, and enabling the expansion to pass below atmosphere, and so lift water from the low-level tank at the same time that exhaust in *A* and compression of the new charge in *B* take place. The cycle is then repeated.

THE HIGH-LIFT PUMPS

Coming to high-lift pumps, any Humphrey pump, whether single or double barreled, may be converted into a high-lift pump by means of an air vessel fitted with valves and called an intensifier. The idea is first to allow the water column to gain velocity and then to utilize its kinetic energy to compress an elastic fluid and to deliver water under the pressure to which the elastic fluid has been compressed. Fig. 4 will make the cycle clear. At the end of the play pipe *D* of a two-barrel pump are two air vessels *E* and *F*, the latter is large enough to give a continuous flow at outlet *O*, and to maintain a practically uniform pressure. *E* is fitted with a pipe *K*, open to the atmosphere at the top and carrying a valve *L* at its lower extremity, arranged to close under the action of the rising water. The cycle starts with explosion, all valves except *L* being shut and the water as shown. The column of water rising at *E* gains speed until valve *L* is shut by impact. The air in *E* is then compressed until its pressure is sufficient to cause the high-pressure water valve *W* to open. Water is now forced into *F* until the column comes to rest, when the valves *W* close. The return flow, caused by the expansion of the compressed air in *E*, exhausts *A* and compresses a fresh charge in *B* to start a fresh cycle. Valve *L* opens when the water level falls below it and air is admitted into *E* for the rest of the return stroke.

If the pipe *K* is made vertically adjustable with regard to *E*, any desired quantity of air can be entrapped in *E*. Since the degree of compression is maintained constant by the pressure in *F*, the amount of energy stored in this air will vary directly with the quantity. Hence, the ratio of the total energy of the working stroke to the energy stored in the compressed air in *D* can be made anything desired, or, in other words, we can obtain any desired pressure of the new charge in *B* entirely independent of the water lift. By manipulating the position of the valve *K*, a given pump can thus be made to meet any conditions as to hight of lift.

Increasing the Capacity of a Pump

An important development of this arrangement is made by connecting *K* to a supply of combustible mixture instead of allowing free opening into the atmosphere. *E* then becomes an automatic pump for taking in mixture and discharging it under pressure. If the discharge is into a reservoir from which combustion chambers *A* and *B* can be supplied, we have at once a means of quickening the cycle and greatly increasing the output of an apparatus of given size. The 1000 h.p. pump now under construction in Germany will operate on this principle.

The Efficiency of the Humphrey Method of Pumping

If the column of water oscillating in the play pipe of the Humphrey pump is used as a water piston, and caused to rise and fall in an air vessel fitted with suitable valves for the inlet and outlet of air, the combination constitutes an air compressor of a very efficient type and of the greatest possible flexibility.

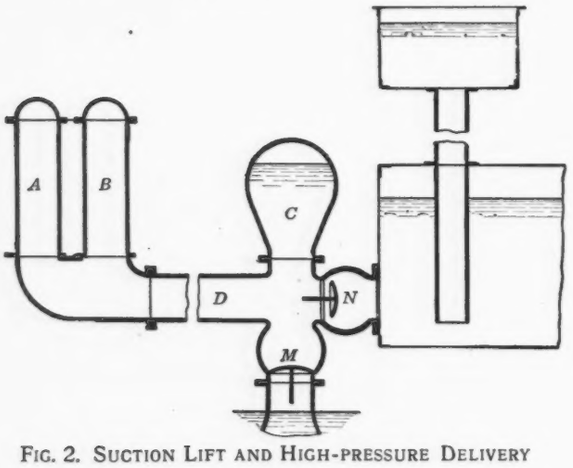


Fig. 2. Suction Lift and High-pressure Delivery

With regard to the efficiency of the Humphrey pump, with a compression pressure of eleven atmospheres absolute, the theoretical thermal efficiency of the cycle is 52.5 per cent., whereas that of the Otto cycle is only 40 per cent. when all corrections for varying specific heat are allowed for. Such compression pressures have not yet been adopted, but they will be employed in the 1000-h.p. pump already referred to. In the meantime, when using only very moderate compression pressures of under 50 lb. per sq.in., an actual thermal efficiency of over 23 per cent. has been obtained on a four-cycle Humphrey pump. This corresponds to 0.95 lb. of anthracite per hydraulic horsepower-hour, and was obtained on a lift of only 35 feet. There is every reason to believe that when the compression pressure reaches that employed in ordinary gas engines, the best efficiencies obtained in gas engines will be reached and probably surpassed by the Humphrey pump.

The Pozos Camp, Guanajuato, Mexico

By Herbert A. Megraw*

The main factor in starting the revival of interest in this Mexican camp was the work done at the Angustias and Cinco Señores mines. Late in 1909 the latter company started a new mill on its property and found that the low-grade ore which the mine was considered able to produce could successfully be treated. The mill ran only a few months when it was found that the condition of the mine would not supply sufficient ore of profitable grade. The mill was temporarily stopped; the mine is now being developed, and the lower levels unwatered.

Late in 1909 the Angustias company began to unwater its mine and at the same time to remodel its mill at San Luis de la Paz for treating the ores by cyanidation. The unwatering was completed in March, 1910, and while ore was being drawn from the upper levels for treatment, the lower levels were developed and the shaft sunk in order to open more ground. Two levels have been opened, both in good ore. During 1910 the average grade of ore milled was about $15 per ton; the production has been about $300,000. The mill is now being further enlarged without interfering with the regular treatment of ores up to the old capacity. The unwatering of the mine and disclosure of conditions at depth have caused the stock, which had been selling at about 40 pesos per share on the Mexico exchange, to reach a high figure of 800 pesos and to settle steadily at 500 pesos, at which figure it is now held and seems to be likely to stay. This placed the value of the mine at 5,000,000 pesos.

The activity at Angustias has stimulated the development of other old mines of the camp, and a great deal of interest has been taken in the work done. At many of them, development work is being carried on with every prospect of satisfactory results. Among the most promising might be mentioned El Oro, adjoining the Dolores mine, which is developing a parallel vein two meters wide and averaging 20 grams of gold and 150 grams of silver. Coloso is another of the older mines being developed with encouraging results. Ocampo, a small mine adjoining Cinco Señores, is in bonanza. One shipment of ore from this mine, about ten tons, averaged 18 kg. of gold per ton.

Among other mines now being developed might be named the following: Trinidad, Constancia, Potosina, Argentina, Santa Lucia and El Dorado. The last has been acquired by the Compañia Minera y Beneficiadora Ojo de Agua, which formerly confined its business to milling custom ores.

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Girod Electric Furnace Installations

A plant at Ugine, France, now has six of the Girod electric furnaces in operation, turning out high-speed tool steels, projectiles, automobile castings, etc. Two of the furnaces have a capacity of two tons per charge, two of three tons of cold or four of molten charge, and two of 16 tons of cold scrap material, although an 18-ton charge was poured on one occasion. These last furnaces each require 1200 to 1500 kw. and are provided with four electrodes. The medium-sized furnaces require 325 to 350 kw. and, like the smallest-size, have only one carbon electrode. The same works is now installing an 8000-kw. furnace.

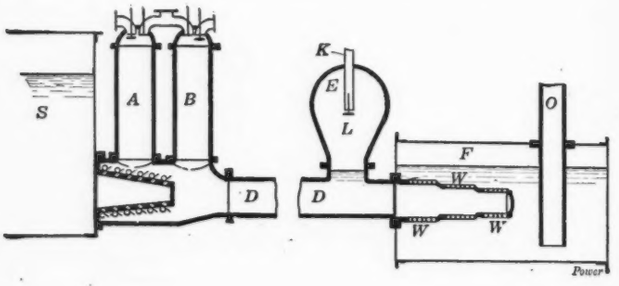


Fig. 3. Two-cylinder Pump for High Delivery Head

The Cockerill company in Seraing, Belgium, has operated a 4- to 5-ton Girod furnace for the last two years refining Thomas steel for rails, locomotive tires, cannon, etc., and Krupp is installing a 12½-ton three-phase-current furnace for the same purpose. The Girod furnace of the Simonds Manufacturing Company, of Chicago, is being transferred to the new plant at Lockport, N. Y., where it will be used for making high-grade tool steel. The Girod company has about 40 other furnaces operating exclusively on ferro-alloys.

Nomenclature of Iron and Steel—II

By Henry M. Howe

Clarification of the nomenclature urged for the two present great divisions of steel and of cast iron. The temporary inconvenience to the trade not an offset to the advantage to the many. While "blister steel" is a vanishing class, "malleable cast iron" is a fixture, so that revision seems expedient for the latter. Reason for illogical nomenclature of iron is that temporary trade convenience alone has been valued. The scientific attitude today and the present international nomenclature committee make permanent clarification possible. Permanent organization would then keep them straight.

Sec. 11. That there should be two radically distinct definitions of steel, and two kinds of steel, the "aggregated" steels and the steels which have been cast, two kinds with absolutely nothing in common, each lacking completely the essential characteristic of the other, is indeed anomalous and unfortunate. The only remedy suggested is to exclude "blister steel," the only variety of the aggregated steels of any importance, from the class "steel" and give it a wholly new name, for instance "blister." But no such change should be attempted unless it has the approval of a substantial majority of the reasonable. As a first step toward learning whether it has this approval, let me try to state the arguments for and against it.

Shall Slag-bearing Blister Steel Cease to Be Steel?

In favor of this change it may be urged:

(1) That it would remove a serious anomaly which, however little it may trouble the steel trade, must necessarily cause more or less confusion to the enormous majority of mankind, those outside of that trade, a majority whose interests should not be ignored.

(2) That this is a most unusually fit time for attempting such a change, because of the existence of a powerful international committee which has this very subject of nomenclature in hand.

(3) That the number of persons whose interests oppose this change, viz: Those who are closely interested in the blister-steel trade, is so insignificant that, conservative though they are, they would have to yield to the united demands of the great technical societies if these societies, adopting a recommendation of this international committee, should demand this change.

On the other hand, the change may be opposed by others on four grounds, as follows:

(1) The history of the Philadelphia movement certainly gives reason to fear that the relatively few makers and users of blister steel, the only member of this variety that has any importance today, would ignore the attempt and go right on calling this product "blister steel," though all the societies under heaven were to thunder protest. They represent the ultraconservative in iron metallurgy; the conservatism which they manifest in their processes might appear in their attitude toward such a change.

(2) With the early disappearance of blister steel the classification will cure itself.

(3) This plan provides no name for "puddled steel." But to this one may reply that, if this product is not already obsolete, it is of such slight importance that it ought not to stand in the way of the proposed clarification of our nomenclature. Should it ever resume importance, it could be given a new name.

(4) The only reason for this reform is the inconsistency between the two meanings of the word "steel." But it is only the harm done by such an inconsistency, and not its mere existence, that could justify a change.

Our language abounds in common words with inconsistent but harmless dual meanings. Among the twenty definitions of the noun "square" in the Century dictionary are the geometrician's "a four-sided plane rectilinear figure, having all its sides equal, and all its angles right angles," and (as part of its third definition) "a public park among buildings." It could confuse no one to call a park a "square" even if it were undulating and had five sides connected with curves instead of angles; yet such a "square" lacks every essential of the geometrician's, being neither four-sided, plane, rectilinear, equilateral, nor rectangular: while the geometrician's "square" lacks all the essentials of the city "square," being neither public, a park, nor among buildings.

Consider how little there is in common between the "bow" of salutation and that of a vessel; between the "bow" which bids adieu to the shower, that of the violin, and that of a bow-knot; between the bull of the stock market, the Irish bull, the papal bull, and a bubble called a "bull;" between the rush used as candlewicking and the act of rushing. One could go on indefinitely. Grant that these two meanings of steel are anomalous; so are the plural meanings of endless common words, but without harm. It is not the existence of dual meanings but only the actual harm done by them that could justify trying to erase one of them.

Nor does the difference between the two meanings of steel do any appreciable harm, beyond throwing a trifling burden on a few teachers and writers, and an insignificant one on any individual student or citizen outside the trade. Let us simply make up our minds that there are, temporarily and only till blister steel goes out of use, two kinds of steel just as there are two or more kinds of squares, bows, bulls, rushes, etc., etc., and do not let us fret ourselves about a duality which does no serious harm, certainly no harm comparable with the energy needed to remove it.

Browning says truly, "But little do or can the best of us." We should devote our strength, of which we are but the trustees, only to the objects most worthy of it. Some may hold that the evil to be cured is so slight that it cannot justify the outlay of energy needed to cure it, in a world in which so many wrongs cry out to Heaven for redress.

Even after long consideration of these arguments for and against, it is with some difference that I give my own judgment, for that of any one man, of course, deserves but little weight. In view of the existence of a committee, which I believe to be unusually competent; of the small number of those whose interest opposes this change; of the considerable simplification which it would give; and of the enormous number of those who would be benefited, even though the benefit to each individual would be slight; the change seems to me on the whole worth attempting. It is the existence of this present committee which seems to me to remove this change from the inexpedient to the expedient class.

Sec. 12. What name shall we give the material of which malleable castings are composed? This is a puzzling question. These castings are made initially out of brittle white cast iron, because this is so fusible that it can be cast cheaply even into thin shapes. They are then made malleable either by removing part of their carbon by long heating (an-

nealing) in contact with iron oxide, for instance,

(1) $3\,Fe_2O_3 + C = 2\,Fe_3O_4 + CO$;

or by converting this carbon, by a like annealing, from its initial state of cementite, to the extreme hardness and brittleness of which white cast iron owes its brittleness, to the state of finely divided or "temper" graphite, thus:

(2) $Fe_3C = 3Fe + Gr.$

In any individual annealing both these reactions take place, but in European practice it is chiefly the former and in American chiefly the latter that is relied on. The product of the European or decarburizing process amounts to some 50,000 tons a year, and is known as "white heart" or "steely malleable." That of the American practice amounts to some 800,000 tons a year, and is called "black heart," because the presence of the finely divided temper graphite gives it a black fracture.

Both black-heart and white-heart castings are called "malleable castings," and the material of which they are composed is called in trade "malleable," using this word as a substantive, or more commonly "mallable." It is also at times called "malleable cast iron," but chiefly, I believe in scientific or at least semi-scientific writings, and rarely in trade parlance. I do not now raise the question of the expediency of calling the castings themselves "malleable castings," though, of course, even this fixed name is unfortunate, because steel castings also are actually malleable. I ask only, "What shall we call the material of which malleable castings are composed?"

Five Plans, but None Unobjectionable

To each of the five courses which suggest themselves there are serious objections, so that we have either to devise some sixth and better course or to choose from among these five, the one which to a majority of the reasonable seems the least bad.

These five courses are as follows: (1) To call it "malleable cast iron," regarding it as simply one variety of cast iron and distorting the definition of cast iron so as to include it. (2) To legitimize the use of "malleable" as a substantive for trade purposes and to provide no scientific name, on the ground that the hodge podge of which this trade group consists has no single property in common, and hence has not enough interest to science to justify the creation of a scientific group name. According to this plan the substance of which malleable castings are composed is "malleable," a species coördinate with "wrought iron," "steel," and "cast iron." (3) To call it "malleablized cast iron," and to regard this as not strictly cast iron but a distinct species, quite as the "malleable" of course 2 is. (4) To invent some new name for it, such as "reaumine," or the iron of Réaumur, who invented the malleablizing process. (5) To call it "malleablized iron."

Let us consider these five courses on their merits, calling this substance "Y-iron" till we decide on its name.

Course 1—If the class "cast iron" is to include Y-iron, we must abandon its definition given above, which makes the essence of cast iron the lack of malleableness due an excessive carbon content, whereas Y-iron is malleable; and, taking advantage of the fact that Y-iron is not malleable when cast, make the essence of cast iron such lack of malleableness at the time when the iron is initially cast. This is done in the following definition.

Alternative Definition of "Cast Iron"

Cast iron: generically, iron which, when molten and when initially cast, contains so much carbon (2.20 per cent. or more) or its equivalent that it is not usefully malleable at any temperature *unless as in the case of malleable cast iron that carbon is later removed or converted into pulverulent or "temper" graphite.* Specifically, cast iron in the form of castings, other than pigs, or remelted cast iron suitable for such castings, as distinguished from pig iron, i.e., the molten cast iron as it issues from the blast furnace, or the pigs into which it is cast. There are four chief varieties of cast iron, of which only the last is usefully malleable.

But to make Y-iron thus a variety of cast iron in virtue not of what it is, but of what it once has been, when all other divisions of iron are classified according to their existing and not to their past properties is a poor makeshift; one is tempted to call it a "dodge." It is anomalous in that it calls Y-iron "cast iron" in spite of its having, in the only state in which the buyer and user know it, the very property, malleableness, the absence of which is the essential of all the other varieties of cast iron, and in spite of the fact that much of it lacks the high carbon content which gives all other cast iron its essential quality of non-malleableness.

No Chance for Class, Malleable Castings, to Die Out

The palliative that makes the anomaly between the definition of weld steel and that of other steel tolerable, that weld steel is about to go out of use and to take the anomaly with it, has no equivalent here, because malleable castings are so useful, and in the nature of the case are likely to remain indefinitely so much cheaper than steel castings, that their use is likely to persist for a long time. Yet, unwelcome as this course of basing the definition of cast iron on a property existing at the time of casting is to writers and teachers, it would probably cause no serious inconvenience to trade and industry, for three of the varieties of cast iron, gray, white, and mottled, are bought and used in the state in which they are initially cast; and as to the fourth, there is not likely to be serious difficulty in finding out whether any individual piece of supposed Y-iron actually was or was not malleable when initially cast, i.e., whether it is a "malleable casting" or not.

Course 2—The objection to this is equally clear. To use an adjective like "malleable" as a substantive, to say that malleable castings are composed of "malleable," and that iron is divided into wrought iron, steel, cast iron, ferro-alloys and "malleable" is certainly unfortunate. But this objection is more apparent than real. The trade already uses "malleable" in this sense very widely. Writers and teachers, when they address the trade, can thus use "malleable" without offense. When they address the lay they can with slight trouble avoid naming this substance, calling the individual castings "malleable castings," a moderately good and widely used name; when they address the scientific they will very rarely have occasion to use a group name for the irrelated substances, black heart and white heart, which the convenience of the trade thus groups together. A further objection is the possibility of confusion between "malleable" thus used and "malleable iron," a name by which wrought iron is widely called in Great Britain.

Objections to Third Course More Apparent Than Real

Course 3—To call Y-iron "malleablized cast iron" at first seems harmless enough; but to hold that "malleablized cast iron" is not "cast iron" at all is another matter. Certainly if a layman was told that a given piece of iron, or a given structure or consignment, was of "malleablized cast iron," he would infer that it was of a variety of cast iron; and if he was then told that it was not cast iron at all he would be surprised, and could retort justly that the nomenclature was confusing and misleading. If then we pointed out to him that neither a dead man, a straw man, a pitman, nor an ottoman is a man; that a saw horse is not a horse at all; that a hermaphrodite brig is not a brig; that a sea dog is not a dog, nor a sea cow a cow, and so forth, he could properly reply that these cases are harmless, because, in fact, they are not likely to cause confusion. This leads us to ask frankly whether course 3 would be likely to cause serious confusion. Of course, it would throw a burden, really an insignificant one, on students, and a trifling one on teachers and writers, a small class. But for two reasons I think that it would not cause any considerable confusion among those who actually need and use these terms in their life's work, those who buy, sell, and use true cast iron and malleable castings, those to whom the present question is of any importance.

(1) This brittleness of cast iron is so familiar, indeed so proverbial that when I say "malleablized cast iron," you readily infer that the state of cast iron is a past and not a present one, as in such expressions as "an extinguished fire," "an abandoned hope," "fuit Ilium," "this gray shadow once a man" and "joy remembered well."

(2) Ninety-nine times out of a hundred, when "cast iron" is spoken of in engineering, trade and industry, Y-iron is excluded by clear implication in the minds of speaker and hearer. "These locks, chains, pots, columns, etc., are of cast iron" would certainly be taken to mean that they were not malleablized castings, that is Y-iron.

Course 4 would be unfortunate because of the dislike or repugnance of most human minds to accepting even a better new name in place of an established one.

A Fifth Course

After this article had been set up the name "malleablized iron" occurred to me, and it now seems to me slightly better than any other so far proposed. It does not, like Course (1), call for an anomalous definition of cast iron; nor like Course (2) use an adjective as a substantive; nor like Course (3) require an apologetic explanation that "this cast iron is not cast iron"; not like Course (4) call for a new name to be learned by heart; for the name though new is self explanatory. "Malleablized iron," does not seem likely to be confounded with "malleable" iron in the sense of wrought iron. Because of its past participle, it suggests the very essence of this species, that it was not malleable initially but has been made malleable, like "a reformed man," "an extinguished fire" etc. Had it been malleable initially it could not have been malleablized, just as the fact that a man has been reformed implies that he must have been faulty, and the fact that a fire has been extinguished implies that it must once have burnt.

On the whole the faults of the fifth course seem to me less than those of any of the others, and I therefore recommend it, though the difference in faultiness is so small that, far from warranting a confident advocacy, it indicates that the judgment of a majority of the reasonable and competent should be sought. I adopt it provisionally in this article.

Is a Bureau of Nomenclature Needed?

Sec. 13. Shall we create a bureau to pass on proposed new names, to decide whether any new product shall be called steel, or what it shall be called, and for like duties? The proposition is attractive and merits careful consideration.

When we reflect that in chemistry, physics, and other pure sciences classification and nomenclature are, or are supposed to be, the work of minds trained in these very subjects, philosophers and students, we naturally regret that, in metallurgy (apart from metallography), classification and nomenclature are not made, but grow. The reason lies close at hand. In chemistry and physics not only have the men of science, the investigators, writers, and teachers, been of overwhelming importance, through their numbers and the nature and bearing of their work; not only has there been a vast body of them with interest and activities far removed from those of chemical and physical manufacture; but the men who have carried on this manufacture have themselves had scientific training, and have carried into that manufacture the traditions and influence of the men of science under whom they have studied. They have turned as naturally and unhesitatingly to their own men of science for their classification and nomenclature as for their theory. Here science had led and practice has followed.

In iron metallurgy the reverse has been true. Here it is the manufacturers that have been of overwhelming importance. There has been no large or important body of scientific metallurgists apart from those who were carrying on metallurgical manufacture. Until within a few decades the great bulk of the manufacture has been carried on without any immediate influence from the men of science. Those who have directed the manufacture have not usually been men of scientific training; they have not brought to their art the influence and traditions of scientific teachers, and they have not turned to those teachers for their classification and nomenclature. Indeed, the very attempts of those teachers to mold the classification and nomenclature have received scant consideration, as the reception of the Philadelphia classification shows. Here it was not science that led, with art eagerly following in the path traced out for it by learning; until the days of Bessemer and Bell it was art that led, while science tagged on feebly after it, with such imperfect explanations as it could offer of the achievements of its leader. But the old order changes. The influence of men of scientific training has increased greatly, and is bound to increase without limit. The time is close at hand, if it has not already come, when a permanent nomenclature bureau should be able to exercise a strong and valuable influence.

Trade Names Controlled by Advertising Considerations

Whether it could control trade names remains to be seen. These are so much like trademarks, and the manufacturer's motive for framing them in such a way as to commend his wares is so strong, that the task of controlling them would prove a difficult one to any disinterested bureau, especially because even the most eminent of bureaus must necessarily lack all legal power of enforcing its decrees. However this may be, we may well consider whether there is not enough good and useful work to be done to justify an organization for this purpose. Possibly it might be formed through or out of the nomenclature committee of the International Association for Testing Materials, in which the technical societies interested in the general subject are officially represented. At least this committee might formulate a plan for the creation of such a bureau.

Traces of the Philadelphia Reform

Sec. 14. Some traces of the attempted Philadelphia reform have persisted. We may here consider how far their continued use should be recommended. These traces are the adjectives "weld" and "ingot," and such combinations as "ingot metal," "weld steel," etc. We should retain those which are useful and are not likely to cause confusion through their conflict with the existing or bessemer classification.

Sec. 15. "Ingot metal" and "weld metal" have proved convenient to writers and teachers, as a means of grouping together the cast slagless kinds of malleable iron on one hand and the aggregated ones on the other hand. They are clear and unmistakable where the bessemer names are ambiguous. When we speak of "steels" we leave some doubt as to whether we include or exclude the aggregated steels; when we speak of "ingot metal" we leave no such doubt. Again "weld metal" clearly includes all the aggregated varieties, both wrought iron and blister steel, and like varieties. The bessemer classification has no corresponding group name. Neither "ingot metal" nor "weld metal" makes any suggestion that can cause confusion through conflict with the bessemer classification. These terms, then, are occasionally convenient; no objection lies against them; and hence they should be retained. The fact that they are not in wide use, while it should be borne in mind by those who would use them, is no more reason for dropping them than there is for dropping nine-tenths of the words in the dictionary. No one man has occasion to use any considerable fraction of the words in the Century dictionary; but to strike out the words which the smith finds needless would be a hardship to the poet, and *vice versa*.

Sec. 16. *"Ingot steel* and *"weld steel"* are terms occasionally convenient for writers and teachers, the former including only the hardenable cast and the latter only the hardenable aggregated kinds of iron. The amended bessemer classification has no name which corresponds to either of these. *"Weld steel"* is clear and unmistakable. I therefore advise retain-

ing it in case "blister steel" is retained. (See "Wrought Steel," Sec. 19.) *"Ingot steel"* of course is meant to cover only the hardenable cast malleable kinds of iron, high-carbon bessemer, crucible and like steels. But it might readily be supposed to include the low-carbon unhardenable kinds, i.e., "ingot iron"; in short it is liable to be misunderstood, and hence the main reason for its existence is gone. I advise that it be not used, and be marked "obsolescent."

Ingot Iron a Confusing Term

Sec. 16 A. *"Ingot iron"* was meant to cover only the unhardenable cast malleable kinds of iron, low-carbon bessemer, crucible and like steels. It seems to me confusing because it calls these kinds "iron," though according to the existing bessemer classification, i.e., to common good usage, they are certainly steel. Though we cannot escape the anomaly of having in "weld steel" a steel which has nothing in common with other steels, we should reduce the confusion as far as possible by insisting that, of the malleable kinds of iron, "steel" apart from "weld steel" shall cover all those cast from the molten state, and that "iron" shall be restricted to those made by aggregating pasty particles. Hence the name "ingot iron" for low-carbon steel is unfortunate, and I advise that it be not used and be marked "obsolescent."

I am the more confirmed in this advice by the attempt of some enterprising makers of extremely low-carbon steel to call their special product "ingot iron," on the ground that it is lower in carbon and farther removed from useful hardenableness than the current low-carbon unhardenable steels of commerce. In short, they attempt to revive this name but to restrict its meaning in a way never intended, and I think without warrant. However well their interesting product may be entitled to a distinctive trademark name, I do not think it either wise or justifiable to appropriate an existing scientific term like "ingot iron" for this purpose, or at least to appropriate in a way which tends to shift its meaning. It is as if the maker of some special breakfast cereal should call it "carbohydrate," and so tend to confuse the popular mind as to the real meaning of this word.

Weld Iron and Wrought Steel Undesirable Terms

Sec. 17. "Weld iron" is identical in meaning with the firmly established name "wrought iron." It has never come into wide use, and is probably understood but by few. It has the advantage over "wrought iron" of being parallel with the names "weld metal" and "weld steel." But this merit does not seem to me great enough to justify an attempt to introduce what is now practically an unknown name, exactly duplicating so familiar and firmly established a name as "wrought iron." Hence I advise that it be not used, and be marked "obsolescent."

Sec. 19. *"Wrought steel,"* still proposed by Professor Kent, would have the advantage over "weld steel" of paralleling "wrought iron." But if we weigh against this, first, its disadvantage of being less accurately descriptive or suggestive than "weld steel," because any steel which has been cast is as truly worked or wrought as weld steel is, whereas "weld steel" reminds us of the essence of this class, the welding together of pasty particles in a bath of slag; and, second, the fact that the formal enunciation of "weld steel" by the Philadelphia committee gives it a standing which "wrought steel" lacks, the residual advantage of "wrought steel" seems to me too small to warrant proposing this practically new name for this little group of products which is likely so soon to disappear, especially in view of the rareness of the need of any such group name. But here opinions may well differ.

If we should adopt the plan of removing "blister steel" and "puddled steel" from the class "steel," we should no longer need either "weld steel" or "wrought steel."

Sec. 20. *Summary.* The matters which, because of their novelty or for other reasons, call for discussion are, (1) my definition of "ferro-alloys;" the proposals (2) to restrict "steel" to initially malleable cast products; (3) to remove "blister steel" from the class "steel" and give it a new name, such as "blister" or some better one, and to rename puddled steel should need arise; (4) to use the name "malleablized cast iron" in place of "malleable cast iron;" (5) that the product of the malleablizing process be not called "steel;" (6) that the terms "ingot iron," "ingot steel," "weld iron" and "wrought steel" be avoided and be marked "obsolescent;" and (7) that a permanent nomenclature bureau be created.

Iodine Extraction

The chief source of iodine[1] is the mother liquor from the Chilean niter works. The iodine exists in the mother liquor as an iodate. A portion of the mother liquor is treated with sodium bisulphite which first liberates free iodine and then reduces that to hydriodic acid. This reduced mother liquor is then mixed with a proper proportion of the original mother liquor, the hydriodic acid and the iodic acid liberated in the untreated solution reacting with complete precipitation of the iodine, if the conditions be correct. If an excess of either substance be used the yield of iodine is decreased, but the iodine which remains in solution can be recovered by proper treatment.

The impure iodine precipitated as given above is then filtered out through canvas, and the iodine cakes are heated, the iodine being sublimed and then caught in condensers.

[1]Abstract from Semper & Michaels "Chilean Nitrate Industry."

California's Gold Production

A correspondent recently inquired of us as to the annual production of gold in California from the beginning of its history. We could not put our hand immediately upon any such statistical compilation and consequently had to collect the figures, which involved considerable search in the library, wherefore we think it is of interest to publish them as follows:

CALIFORNIA GOLD PRODUCTION.

Year.	Value.	Year.	Value.
1848.....	$10,000,000	1879....	$17,600,000
1849.....	40,000,000	1880....	17,500,000
1850.....	50,000,000	1881....	18,200,000
1851.....	55,000,000	1882....	16,800,000
1852.....	60,000,000	1883....	14,120,000
1853.....	65,000,300	1884....	13,600,000
1854.....	60.000,000	1885....	12,700,000
1855.....	55,000,000	1886....	14,725,000
1856.....	55,000,003	1887....	13,400,000
1857.....	55,000,000	1888....	12,750,000
1858.....	50,000,000	1889....	12,586,722
1859.....	50,000,000	1890....	12,500,000
1860.....	45,000,000	1891....	12,600,000
1861.....	40,000,000	1892....	12,000,000
1862.....	34,700,000	1893....	12,080,000
1863.....	30,000,000	1894....	13,370,397
1864.....	26,600,000	1895....	14,928,600
1865.....	28,500,000	1896....	15,235,900
1866.....	25,500 000	1897....	15,000,000
1867.....	25,000,000	1898....	15,300,000
1868.....	22,000,000	1899....	15,100,000
1869.....	22,500,000	1900....	15,650,000
1870.....	25,000,000	1901....	16,891,400
1871.....	20,000,000	1902....	16,972,100
1872.....	19,049,098	1903....	16,104,500
1873.....	18,025,722	1904....	19,109,600
1874.....	20,300,531	1905....	19,197,100
1875.....	17,753,151	1906....	18,832,900
1876.....	.....	1907....	16,853,500
1877.....	15,000,000	1908....	19,329,700
1878.....	15,260,679	1909....	21,271,300

The data for gold production from 1848 to 1871 are given by Raymond in his Sixth Report (for 1873) as "compiled from various sources." The data for subsequent years are taken from the several volumes of *The Mineral Industry*. The latter gives no figure for 1876, nor does a figure for that year appear in any other authority consulted.

The figures for years subsequent to 1857 are probably fairly close approximations. Less so for previous years. The figures given for 1848 and 1849 seem to be quite doubtful, the exportation of treasure from San Francisco in 1849 having been only $4,921,250 (see Ross Browne's report for 1867, page 50).

Allowing $15,000,000 for 1876, the total production of gold in California, 1848-1909, according to the above figures was $1,552,517,900 = 75,109,719 oz. = 2575 tons of 2000 lb. = 4288 cu.ft. If all this gold were collected in one mass it would form a cube of about 16¼x16¼x16¼ ft., or a column with a base 4x4 ft., and 268 ft. high.

Coal Mining Department

The Important News Of Coal Mining. New Appliances, New Methods. New Fields, Colliery Engineering

Western Coal Rates

WASHINGTON CORRESPONDENCE

The River and Rail Coal and Coke Company of Kentucky has filed a complaint with the Interstate Commerce Commission against the Illinois Central, asking that the present rate of $1.77 per ton on coal from Morganfield, Ky., to Chicago, Ill., be reduced. The present way of making the rates, it is said, gives an undue preference to the Illinois coal.

A petition has been filed with the Interstate Commerce Commission asking for better rates on bituminous coal from the Utah coal-mining district. The petitioners are the Consolidated Fuel Company and the Castle Valley Coal Company, and the defendants named are the Atchison, Topeka & Santa Fé and 25 other railroads.

The coal operators request that they be given lower rates from the Utah district to points in Idaho, Montana, Washington, Oregon, Nevada and California, not to be in excess of the rates now in effect to these same points from the Wyoming coal-mining district. Further it has been asked that lower rates be given the Utah operators to points in Nevada and California, which will not be in excess of the rates now in effect to the same points from the New Mexico coal mines.

The petitioners also ask the commission to investigate the car supply, train service, rules and practices of the railroads in connection with the Utah mines.

Certificated Coal Miners

The new "coal mines regulation act" for British Columbia requires that "no person shall be employed as a coal miner in any mine, who is not in possession of a certificate of competency as such." The act also specifies:

(1) Coal miners' certificates of competency shall be granted by a board of examiners, consisting of not less than three competent persons; such board to be constituted at each colliery which the lieutenant-gouvernor in council may designate, and such board shall consist of the following persons:

(*a*) One appointed by the lieutenant-governor in council.

(*b*) One, with two alternates, appointed by the manager or managers of the colliery.

(*c*) One coal miner with two alternates, possessed of certificates of competency as such. Such coal miner, and coal-miner alternates, shall be elected by the coal miners whose names shall appear on the list referred to in section 12 of schedule 3 of this act.

(*d*) The proceedings of the board shall be in accordance with the rules contained in schedule 3 of this act.

(*e*) An inspector of mines shall, *ex officio*, be a member of all boards under this section within his inspectorate.

(2) Such board shall hold office for one year or until their successors are appointed.

No certificate of competency shall be granted to any coal miner who does not satisfy the majority of the board of examiners that he is sufficiently conversant with the English language, and with the provisions of the acts relating to coal mining and rules and regulations made thereunder, to render his employment as such safe, and also that he has been employed in a coal mine for at least 12 months previous to the date of his application for such certificate, and has sufficient knowledge of methods of coal mining to render him competent to perform the duties appertaining to his employment.

Evidence in Favor of Wetting a Mine

Coal-mining engineers and superintendents seem to have arrayed themselves either for or against the plan of wetting a mine. Those who oppose the system of sprinkling or introducing moisture underground, point to the great loss of lives from falls of roof. Their claim is that the introduction of moisture into the workings causes disintegration of the roof and sides, thus increasing the fatalities due to falls. All information, therefore, bearing on this subject is particularly interesting.

One of those who favors the wetting of mines as a means of preventing dust explosions is Mr. Haas, consulting engineer of the Consolidation Coal Company, in West Virginia. Mr. Haas has been introducing moisture into his mines for quite some time, and has been carefully investigating the effect. At most of the mines, the wetting is accomplished through the introduction of steam into the intake air, as well as by the more common system of sprinkling. In no case has there been any indication that the water has affected the roof or sides. Mr. Haas states further: "As you are aware, we have had two gas explosions in two of our mines recently, due to outbursts of gas from gas wells. These mines were two of a large number which we attempted to keep saturated with exhaust steam. The fact that neither of the two explosions propagated beyond the limit of the gas mixture gives us almost conclusive confidence that a wet mine, with saturated humidity of its atmosphere, is safe, so far as the propagation of an explosion is concerned."

Vast Coal Tracts Held in Reserve

Figures compiled in the different county commissioners' offices in western Pennsylvania, indicate that J. V. Thompson, of Uniontown, Penn., is the largest individual owner of coal lands. The Pittsburg Coal Company has the largest holdings among the coal companies and corporations. Mr. Thompson and his associates own or control more than 24,000 acres of coal in Washington county and approximately 125,000 acres in Green county. The average assessed value of the coal in Washington county is $75 per acre, which is a low valuation for the Pittsburg seam. The land in Greene county is assessed at an average price of about $50 per acre. Statistics show that in Washington county, the Monongahela River Consolidated Coal and Coke Company's holdings have the highest average acre assessment of any company operating in the county—$300. This high assessment is due to the fact that all this coal is in the Monongehela valley, or adjacent thereto and has a much higher selling rate and value than the inland fuel.

Marianna—Corrections

In the first article describing operations at the Marianna mine, published Jan. 21, the synopsis on page 177 stated that the mine is designed for an output of 10,000 tons per day. For an eight-hour day this statement is excessive. Marianna has repeatedly made 150 hoists an hour, and figuring on six tons to the hoist, this gives a capacity of 900 tons per hour. It is expected, however, to put out a tonnage of 5000 per day, without any undue rush and without overloading the machinery. In the second article published Jan. 28, the table on page 232 showed that the sulphur of the coke made from washed coal, averaged 9.14. The correct figure for sulphur in coke is 0.914 per cent.

Model Coal Mine at Marianna

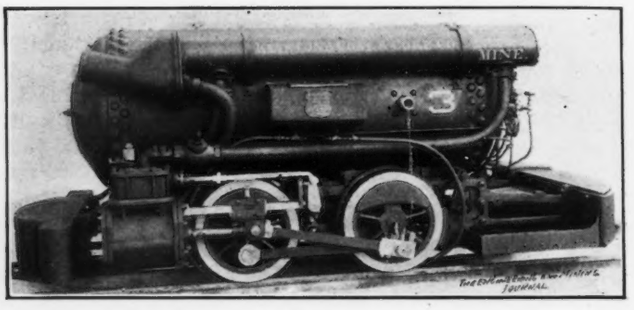
By A. C. Beeson *
and Floyd W. Parsons

This article is fifth of a series, and concludes the description of methods and equipment at Marianna. The underground haulage is accomplished entirely with compressed-air locomotives of two-stage type.

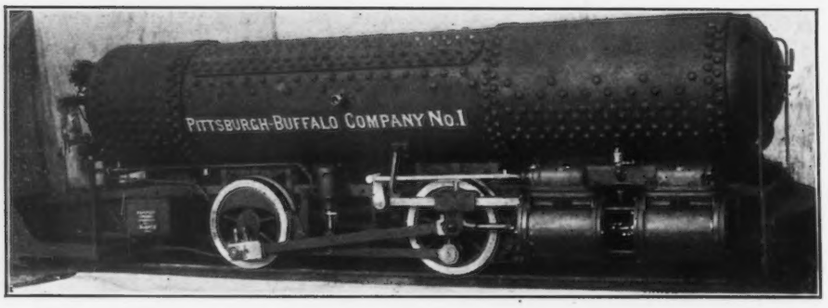
*Chief engineer, Pittsburg-Buffalo Company, Frick building, Pittsburg, Penn.

Much thought was given to planning the extensive system of ventilation now employed at Marianna. An abundant supply of air is maintained at the face of all working places, and the maintenance of the ventilation receives particular attention. Maps are regularly prepafed showing the direction of all air currents. The amount of air circulated in various parts of the mine is determined by measurements made regularly at all principal splits and regulators. There are but few doors in the ventilating system; overcasts of brick and concrete with steel beams are designed and built in the most substantial manner. At the foot of the air shaft, the current is divided into four splits, and the air currents are carried in headings separate from the haulage headings, the latter being ventilated by small currents through regulators.

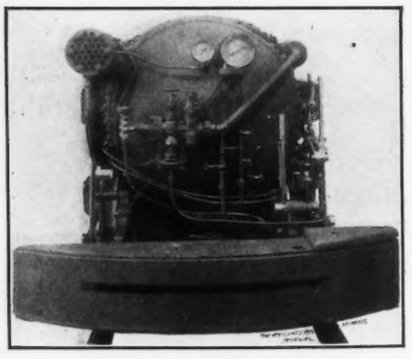
THE RIGHT SIDE OF THE 6-TON LOCOMOTIVE



LEFT SIDE OF THE 6-TON MOTOR



SHOWING THE RIGHT SIDE OF THE 19-TON PORTER LOCOMOTIVE



SHOWING THE OPERATING END OF 6-TON MOTOR

THE HAULAGE SYSTEM

With the exception of a short period during development, mules have never been employed in the Marianna mine. All gathering is done by six-ton Porter air locomotives, 20 of these being in use at the present time. These locomotives collect and distribute the cars from and to the rooms and deliver the loaded cars to the ends of the butt headings. Space is provided on each haulage butt between the last room and the face entry for about 15 loaded cars. A diagonal "layoff" is driven from a point on the face heading so as to give storage for about 25 empty cars. The haulage locomotives push the empty trip into this layoff, which serves as a siding. The loads are then pulled out of the butt ends. This arrangement leaves the main haulage road clear at all times for the express motors and does not necessitate any double-track heading. The main haulage motors at present used, are one Porter 19-ton and one Porter 14-ton. The accompanying illustrations show the various types of locomotives used.

All the locomotives are of the two-stage type. This constitutes a distinct step in advance and is an interesting example of recent progress in overcoming the difficulties and eliminating the losses due to unmanageable refrigeration. These results are obtained in this case without the use of any artificially heated substance, fire of any form being, of course, highly objectionable in a mine.

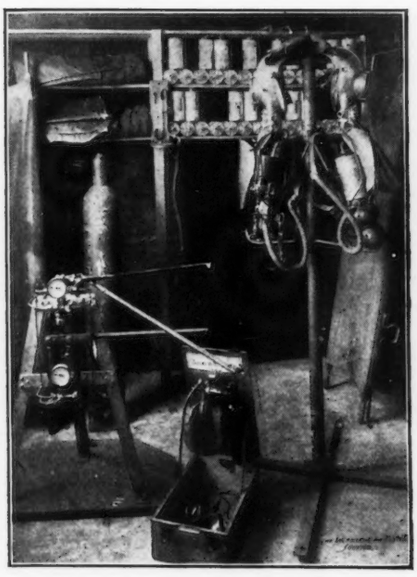
The tanks are charged at about 850 lb. per sq.in. pressure and the air enters the high-pressure cylinders through a reducing valve, which reduces the pressure to about 250 lb. Here it is expanded to about 50 lb., doing about half of the total amount of work of which it is capable. The high-pressure cylinders are on the right and the low-pressure cylinders on the left side. In the large motors these are arranged in tandem in order to reduce the clearances which would be required for one large-diameter cylinder.

From the high-pressure cylinder the air passes through an atmospheric inter-heater, which is below and between the tanks of the large machine, and is mounted on the side of the smaller one. This heater is clearly shown in one of the accompanying photographs, which also shows the pipes leading to it from the high- and from it to the low-pressure cylinders. The exhaust from the latter is used to create a draft in the tubes of the heater. This is accomplished by the ejector action of the exhaust in the draft stack shown in front of the heater. The sharply curved pipe is the exhaust.

The air enters the inter-heater at a temperature of about 70 deg. below zero,

having lost about 130 deg. from the mine temperature of about 60 deg. In the heater it regains a large part of this loss, being also expanded, so that not only is refrigeration controlled, but a high economy is maintained. The six-ton locomotives haul trains varying from 3 to 15 cars, while the main-haulage motor trains contain from 15 to 45 cars. They travel from 3000 to 10,000 ft. without recharging, the distance depending on the loads and grades.

The air is delivered to the charging stations at a higher pressure than that at which the motors are charged, in order that the charging process may be a simple one of partial equalization. The larger motors require about two minutes and the smaller ones about one minute to charge.



A Corner of the Rescue Room in the Bath House

The mine cars used at Marianna are of substantial construction, the design having been worked out by the company's engineers as the result of years of practical experience.

The adopted design has steel frame and sides with oak bottom. The construction is shown in the accompanying cross-section. Four tees, 5x2½x¼ in. extend transversely under the bottom, and are riveted to the center Z-bars, and the side L's, thus forming a rigid steel underframe.

The axle bearings are bolted to the side frames. The cast-steel spring drawheads are connected to a continuous center bumper formed of two "Z" bars and a plate. Wheels and axles of a design developed by D. G. Jones, general manager of the company, and made by the Phillips Mine and Mill Supply Company, have shown good results on these cars.

The weight of each car empty is about 4000 lb. and the capacity is about 6000 lb. of coal. End lift doors and double brakes are provided. Each car has a metal number and name plate, bearing date, name of manufacturer, and a record of the wheels and axles.

Emergency Repair Shop Underground

Near the Rachel shaft a shop for emergency repairs is located in the coal. It is equipped with a Yale & Towne Triplex block and I-beam trolley, an air-engine-operated radial drill press; and a power grindstone. Other tools will be installed as they are needed. This shop has brick side walls and arched roof.

A pipe shop is also provided in one of the headings. A machine operated by a Troy vertical engine and capable of cutting and threading pipes from 2½ in. to 8 in., diameter is installed. Storage racks for a large quantity of pipe of various sizes are conveniently arranged.

Emergency Hospital at Marianna, on First Floor of Bath House

Economy

On the large picking bands in the tipple house, the entire output of lump coal is scrutinized and carefully picked free from all bone and slate. This constitutes an unusual precaution. It does not in any way take the place of the separation of draw slate at the face by the miner, which is just as strongly insisted upon as at mines where no picking bands are installed. This is also in the line of economy, as it saves the expense of loading, hauling, hoisting and disposal of slate otherwise necessary.

The picking bands are required, in order to produce absolutely clean coal. On account of insufficient lighting for the purpose, and of the difficulty of rigid supervision, it is impossible to pick coal in the mine, especially of bone or roof coal. It is frequently attempted to pick such refuse from the railroad cars while the coal is being loaded, but it is evident that this can do little more than improve the appearance of the load, as the percentage of refuse removed from the top of the car to the whole load must be very small; furthermore, the cost of removing the refuse thrown off the cars, which must be picked up from between the tracks in the loading yard is prohibitive. The installation of 4-in. screens and of devices to classify more than the usual number of grades of coal, also the system of inspection and tests by which the washery is regulated, are also in the line of economy and efficiency.

The saving of fuel and labor effected in the power plant by the waste heat system; the stokers, the coal and ash handling machinery, and the thoroughly protected steam piping; the saving to be realized from the use of the repair shop in making repairs for all the company's mines, all these and numerous other practices may be pointed to as points in the design of the surface plant making for economy.

The question of track has received careful consideration. Several designs of portable room track are being given trial. The installation of a pipe machine in the mine is productive of great saving, especially where compressed air is the power used.

The engineering department keeps a list of all equipment at the various mines and makes a point in designing new equipment and machinery to duplicate parts already in use so far as possible, so as to reduce the number of extra parts carried, and at the same time, facilitate repairs. Equipment is readily and frequently transferred from one plant to another for temporary or permanent use.

Safety Precautions

Of all the causes of accident in coal mines the most prolific of death is the fall of the draw slate at the coal face. It takes its victims one at a time, quietly

in the remote workings, perhaps, and creates no excitement and generally no newspaper comment; nevertheless the danger is ever present.

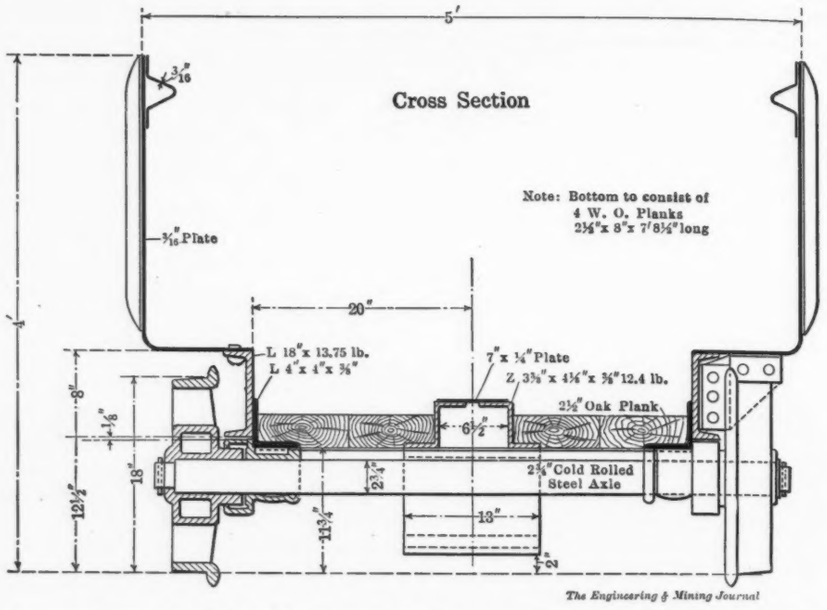
The conditions are these: After a cut of coal is shot down, the slate originally above that cut is still in position, but it is not stable enough to form a permanent roof; in order to prevent its becoming hopelessly mixed with the coal, it must be left in place temporarily supported until the coal is loaded, when it is allowed to fall and is hauled away from headings or stored in rooms as the case may be. Now it is in the troublesome placing of these temporary props that the ignorant miner fails. He too often hopes to get that coal without sufficient posts and get away before the slate comes down, and he frequently fails.

The only remedy for this condition lies in the education of the miner. It is impossible for the mine foreman or any reasonable number of foremen to visit each working place often enough to personally order the placing of each post, even if he could impress the mind of the worker with the danger that exists. It is to be remembered that the miner is a contract and not a day worker and so he is not amenable to dictation on detail methods of his work.

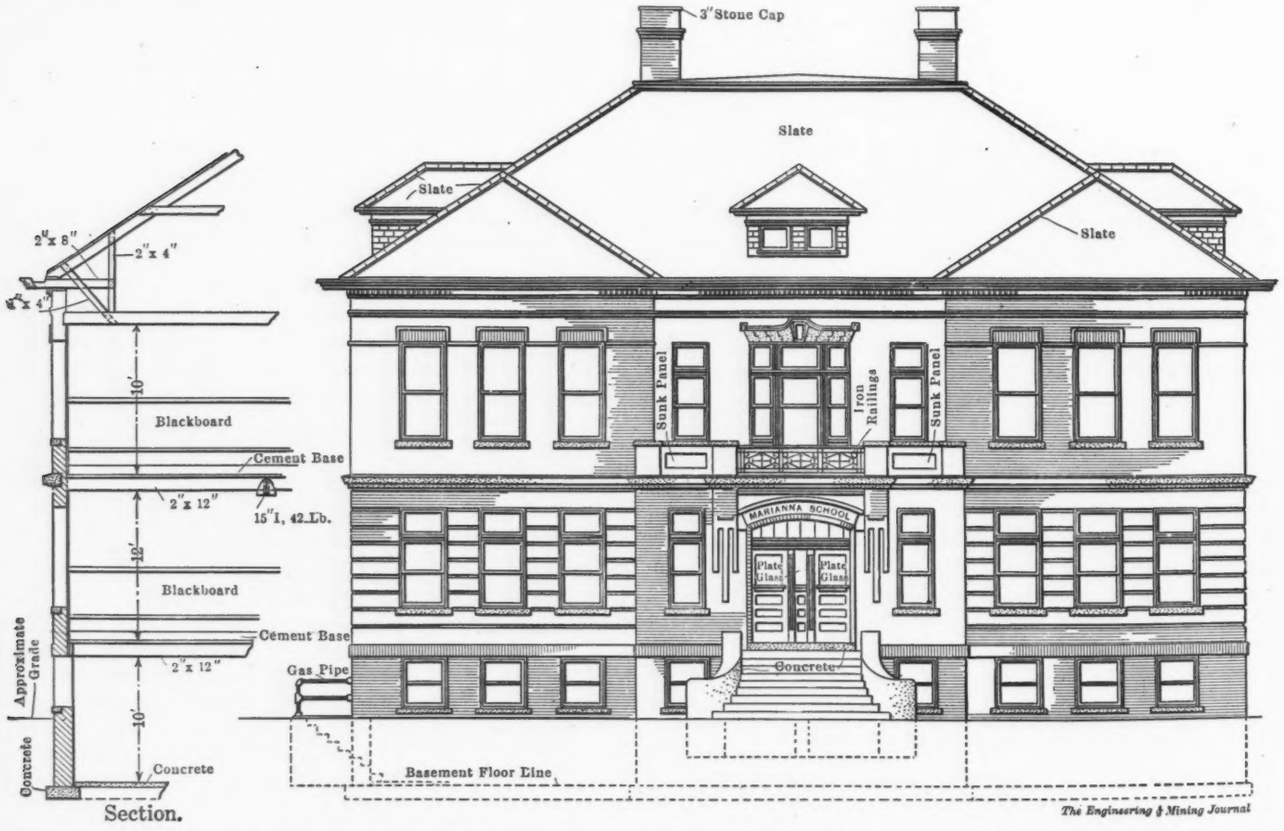
as far as possible of a stable organization, will be most effective. It is planned to institute in the Amusement Hall, regular classes receiving instruction in mining methods and in first-aid treatment, thus reaching directly all those employees who have a desire to profit by such instruction.

MANY MECHANICAL DEVICES USED

Many mechanical safety devices have been installed. One of the most interesting of these is placed at the foot of the shaft. This consists of two pairs of "Horns" on each track, so placed that the forward pair engages the wheels of the first car which is ready to be placed on the



SHOWING DETAILS OF MINE CAR USED AT MARIANNA. THE WHEELS AND AXLES ARE OF SPECIAL DESIGN



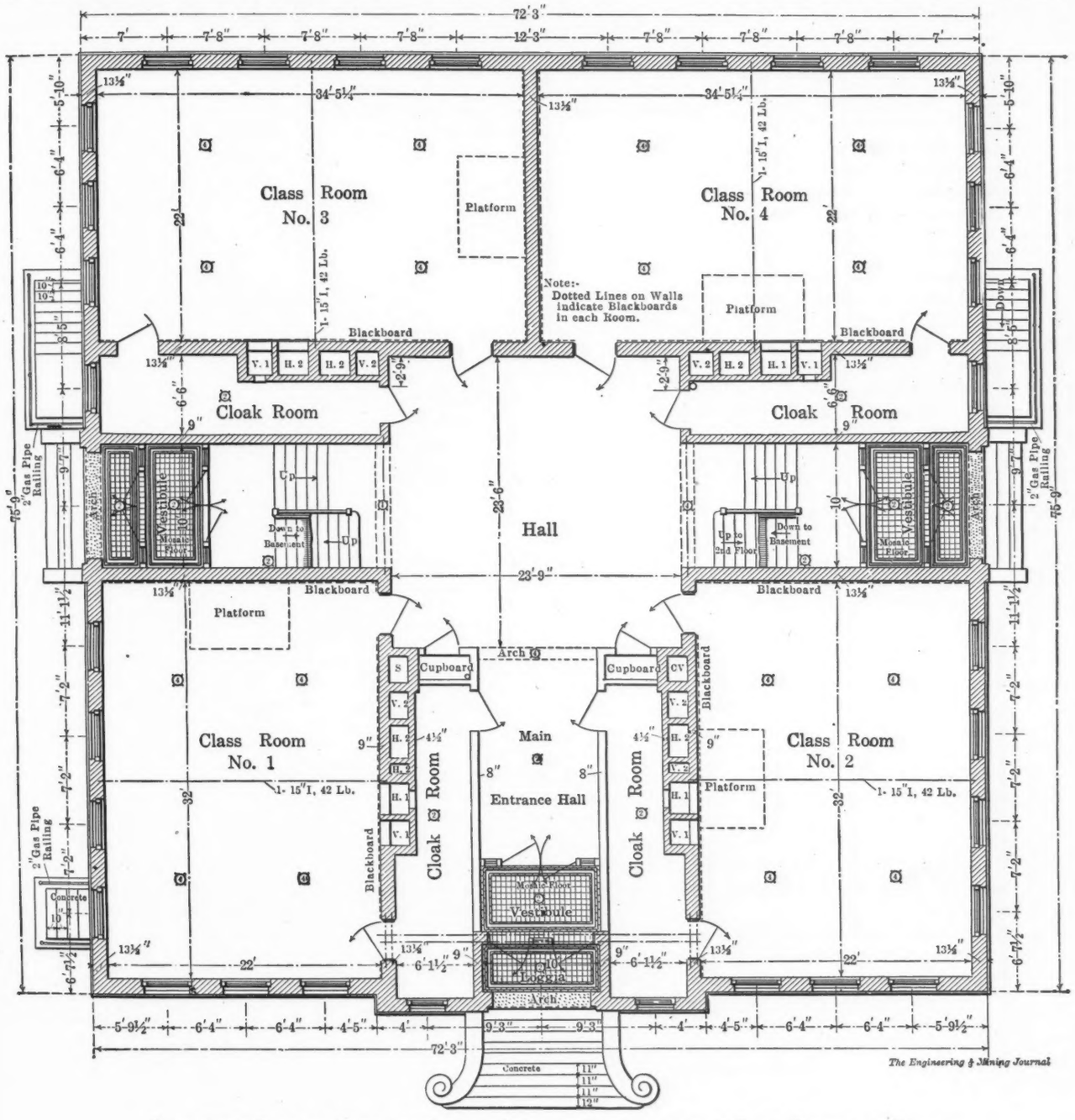
FRONT ELEVATION OF SCHOOL HOUSE DESIGNED TO ACCOMMODATE THE CHILDREN OF EMPLOYEES AT MARIANNA

next cage, while the other pair of horns are in position to hold the third car after the two first cars have run on the cage. The horns are connected by levers to a trigger which engages the cage, and a counterweight which ordinarily keeps the forward horns up engaging the wheels and the rear horns free of the wheels. When the cage lands it carries the trigger down, elevates the counterweight, releases the first 2 cars and retains the second two. When the cage is hoisted, the counterweight drops, the second two cars run to the forward horns and two more cars take their place. This device is simple, durable and reliable. It not only prevents a car from accidentally running into the sump, but materially lightens the labor of the cages.

Similar devices are employed on the cage and the tipple transfer as already described and in short, all such arrangements possible are made to secure the safety of the men and the continuous operation of the mine.

A steel highway bridge has been built at considerable expense so that travel to and from the town may be carried over the yard tracks.

In equipping the plant, the Pittsburg-Buffalo Company has endeavored to take the following features into consideration. The installation of fireproof buildings, preventing long shut-downs due to fires, and making the risk small; the installation of the most modern machinery tending to economical operation, and lastly the provision of homes and surroundings that will attract the most intelligent class of men to Marianna. In concluding this series of articles, the authors particularly desire to make mention and give credit to the firm of Roberts & Schaefer in Chicago, and to the Jeffrey Manufacturing Company of Columbus, Ohio, for data and drawings of the tipple and some of the other surface installations. Acknowledgment is also made to the Link Belt Company for information relative to the system of handling slack in the boiler house and slack bins.



FIRST-FLOOR PLAN OF MARIANNA SCHOOL, SHOWING ARRANGEMENT OF CLASS ROOMS AND EXITS

NEW PUBLICATIONS

NINETEENTH ANNUAL REPORT OF THE ONTARIO BUREAU OF MINES, 1910. Part I. Toronto, Ont.; King's Printer.

A MANUAL OF THE PRINCIPAL INSTRUMENTS USED IN AMERICAN ENGINEERING AND SURVEYING. 50c. W. & L. E. Gurley, Troy, N. Y.

COAL MINES 1910: A List of Bituminous and Semi-Bituminous Mines in States East of the Mississippi River. $5. B. H. Rose, Cleveland, Ohio.

NORTH DAKOTA LIGNITE AS A FUEL FOR POWER-PLANT BOILERS. By D. T. Randall and Henry Kreisinger. Bull. 2, Bureau of Mines, Washington.

REPORT OF THE CHIEF INSPECTOR OF MINES IN INDIA FOR THE YEAR ENDING DECEMBER 31, 1909. By J. R. R. Wilson. Department of Mines, Calcutta, India.

OIL AND GAS IN LOUISIANA, WITH A BRIEF SUMMARY OF THEIR OCCURRENCE IN ADJACENT STATES. By G. D. Harris. Bull. 429, U. S. Geological Survey, Washington.

GEOLOGY AND WATER RESOURCES OF THE SAN LUIS VALLEY, COLORADO. By C. E. Siebenthal. Water-Supply Paper 240, U. S. Geological Survey, Washington.

NATIONAL ASSOCIATION OF CEMENT USERS. Proceedings of the sixth annual convention, Volume VI. Published by the association, at Philadelphia, Penn.

OTTO HUEBNER'S GEOGRAPHISCH-STATISTISCHE TABELLEN ALLER LAENDER DER ERDE FUER DAS JAHR 1910. By Franz Von Juraschek. 1.50m. Heinrich Keller, Frankfurt.

GEOLOGY AND MINERAL RESOURCES OF THE SOLOMON AND CASADEPAGA QUADRANGLES, SEWARD PENINSULA, ALASKA. By Philip S. Smith. Bull. 433, U. S. Geological Survey, Washington.

THE GEOLOGY AND ORE DEPOSITS OF HEDLEY MINING DISTRICT, BRITISH COLUMBIA. By Charles Camsell. Memoir No. 2, Canadian Department of Mines, Geological Survey Branch, Ottawa.

THIRTY-FIRST ANNUAL REPORT OF THE DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY TO THE SECRETARY OF THE INTERIOR; FOR THE FISCAL YEAR ENDED JUNE 30, 1910. U. S. Geological Survey, Washington.

REPORT OF ANALYSIS OF ORES, NON-METALLIC MINERALS, FUELS, ETC., MADE IN THE CHEMICAL LABORATORIES DURING THE YEARS 1906, 1907, 1908. Arranged by F. G. Wait, Department of Mines of Canada, Mines Branch, Ottawa.

CONTRIBUTIONS TO ECONOMIC GEOLOGY (SHORT PAPERS AND PRELIMINARY REPORTS), 1909. Part I, Metals and Nonmetals, except Fuels. By C. W. Hayes and Waldemar Lingren, geologists in charge. Bull. 430, U. S. Geological Survey, Washington.

MINERAL RESOURCES OF ALASKA; REPORT ON PROGRESS OF INVESTIGATIONS IN 1909. By Alfred H. Brooks and others. 6x9, pp. 432. *Bull.* 442, U. S. Geological Surv., Washington.

This is, as its title implies, a general survey of the mineral and power resources of the entire territory of Alaska, as known on Jan. 1, 1910.

TWELVE YEARS FOLLOWING MINING STOCKS AND THE RESULT. (Investor's Dairy). Edited by George E. Vigouroux, of the New York Mining Age; 62 pp., $1.

The hero of this tale, after several years of wandering in the Broad Street financial wilderness, at last sees light and recoups the losses of his earlier experiences with the mining stock "bulls and bears." It is interesting and to the tyro will be instructive. The hero's final success is apparently due to good luck rather than great wisdom.

GEOLOGY AND ORE DEPOSITS OF THE REPUBLIC MINING DISTRICT. By Joseph M. Umpleby. Bull. No. 1, 1910. 65 pp. Washington Geological Survey, Seattle, Wash.

This first bulletin of the Washington Geological Survey is a comprehensive discussion of the Republic mining district. The report discusses the geology of the district and the genesis of the ore deposits, and briefly describes the mining operations which have been carried on in the district. It is a satisfactory report and a convenient record of the facts relating to a district which is not so well known as its production would justify.

INFORMES Y MEMORIAS DEL INSTITUTO MEXICANO DE MINAS Y METALURGIA, 1909-10, Tomo I. 262 pp., Mexico, D. F.

This newest of mining societies has issued an interesting and creditable volume covering a wide range of subjects ably treated. Notable articles are "Smelting in High Altitudes," by R. L. Lloyd; "A New System of Cyanide Treatment of Slimes," by Ferdinand McCann; "Cyanide Treatment of Concentrates," by A. Grothe; "The San Rafael Mill," by E. Girault; "The Valuation of Ore Bodies," by H. S. Denny; "Continuous Pachuca Tank Agitation at the Esperanza Mill," by M. H. Kuryla. These articles are in both Spanish and English and some are fully illustrated by photographs, maps and charts. The volume speaks well for the vitality and earnestness of the founders of the Institute and presages usefulness for the society in its important special field.

TESTING FOR METALLURGICAL PROCESSES. By James A. Barr. 5x8½, pp. 216; $2. Mining and Scientific Press, San Francisco.

Contents: Chlorination; cyanidation; chloridizing roasting; pan amalgamation; pot roasting; Parkes process; Ziervogel process; lixiviation of copper ores; electrolytic processes; zinc smelting; furnace tests; fuel tests; pyrometry; retorting; bullion refining; concentration tests; smelting; cost data.

The book is primarily a textbook for students, but is also a reference book for the practising engineer provided that he can overcome an aversion to its professorial style. The chapter on electrolytic refining is hopelessly inadequate, but the rest good.

FURMAN'S MANUAL OF PRACTICAL ASSAYING. Revised by W. D. Pardoe. 6x9, pp. 530 + viii. $3. John Wiley & Sons, New York.

This is the seventh edition of this invaluable textbook of assaying, a testimonial in itself to its merits. In the present edition no less than six chapters have been rewritten and many additions made, among the latter being the Pearce method for tin, the bromate method for antimony, and a full description of the Shimer combustion crucible. The chapter on phosphate-rock analysis has been omitted, very properly, we think, as this is a distinct subject with textbooks of its own, and a method for the analysis of commercial cyanide substituted. The methods for the analysis of copper bullion are somewhat antiquated, and the chapter on arsenic could be improved by excision, now that Neher's method has been added, but there is, in our opinion, no question that the book is without a rival in its field.

RECORD OF THE FIRST SERIES OF THE BRITISH DUST EXPERIMENTS CONDUCTED BY THE COMMITTEE APPOINTED BY THE MINING ASSOCIATION OF GREAT BRITAIN. A Record of the Experiments Carried Out During 1908 and 1909 at the Altofts Experiment Station. 10s. The Colliery Guardian Company, Ltd., London.

This book is probably the most pretentious work so far completed, in regard to the great problem of dust explosions in coal mines. The volume contains absolute proof of the explosibility of a mixture of coal dust and air in the absence of imflammable gas. The experiments were all conducted in an atmosphere entirely free from imflammable gas, and no permitted explosives were used. The subject of preventing explosions by having stone-dust zones underground, is treated at length. The book contains a large number of photographs and drawings, which are complete in detail, and illustrate the text in a satisfactory manner.

PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

S. S. Fowler, of Nelson, B. C., has been visiting New York.

George Moore, of Joplin, Mo., is spending the winter in Paris.

A. C. Conway, of Colorado, is a visitor to the Porcupine camp in Ontario.

C. B. Flynn, of New York, has returned to Porcupine, Ont., from a two-months' trip to Europe.

Lewis T. Wright passed through New York, Feb. 10, on his way from London to San Francisco.

Alexander P. Rogers has left New York on a professional trip to Brazil, to be gone several months.

Henry Metzler has succeeded M. E. Appelbaum as president of the New York Metals Selling Company.

C. L. Lawton, general manager of the Quincy Copper Company, has returned from Lansing to the mine.

James Doyle, of Denver, Colo., recently examined several prospects in the Porcupine district, Ontario.

O. H. Scott, of Toronto, Ont., sailed for England last week. His address in London is at the Savoy hotel.

Quincy A. Shaw, president of the Calumet & Hecla and subsidiary companies, has been a visitor to the mines.

Arthur Howe Carpenter, of Denver, is examining mines in the Table Mountain and White Pine districts, Nevada.

W. S. Keith, of Los Angeles, Cal., is making mining examinations in the White mountains for Los Angeles people.

Dr. William B. Phillips, director of the Geological Survey of Texas, has been examining iron-ore properties in Missouri.

Edward L. Estabrook, late at the University of Pittsburg, has been appointed instructor in petrology at Lehigh University.

J. V. N. Dorr was in New York last week on his way back to Denver from Europe, where he has been for two months past.

R. Alvin Weiss has been engaged by F. Augustus Heinze to take charge of the development of the Foster property, Porcupine, Ontario.

The office of Thomas H. Glaggett, chief engineer of the Pocahontas Coal and Coke Company, has been removed from Bramwell, W. Va., to Bluefield.

Frank P. Bassett, for several years superintendent of the blast-furnace department of the Maryland Steel Company, at Sparrows Point, Md., has resigned.

Harry L. Day, general manager of the Hercules mine, at Burke, Idaho, is in Pasadena, Cal., with his wife and son. He has just returned from a trip to Honolulu.

Prof. J. C. Branner, of Stanford University, with six assistants, will start on April 15, to explore a portion of the coast of Brazil, the expedition to be aided by the Brazilian government.

Bewick, Moreing & Co., of London, are sending out several engineers to examine property in the Porcupine district, Ontario, for the Northern Ontario Exploration Company, lately organized in London.

James McNaughton, general manager of the Calumet & Hecla, has returned to the mine after a visit to the State capitol, at Lansing, where he has been in attendance at the hearing on the proposed tonnage tax legislation.

Eugene P. Thomas has been elected president of the United States Steel Products Company to succeed James A. Farrel, who resigned to become president of the United States Steel Corporation. Mr. Thomas has been Mr. Farrel's assistant.

Joseph Irving, mining and metallurgical engineer, who has lately been at Alma, Colo., in behalf of the Colorado Gold Mining and Smelting Company, for which company he erected a 200-ton smelting plant and put it into operation, has removed to Salt Lake City, Utah, where he has opened an office.

Frederick G. Clapp has enlarged his geological engineering practice, and will now specialize in examining and reporting on coal in addition to oil, gas and water propositions. C. V. Gould, mining engineer, will be in charge of this branch of the work. The general offices will be maintained at No. 331 Fourth avenue, Pittsburg, Penn.

Robert H. Richards recently returned to Boston from a trip which included a dinner at the Plaza hotel, New York City given to the contributors to the "Encyclopædia Britannica." He also made a professional trip into Pennsylvania and a visit to the John Hays Hammond Laboratory, at the Sheffield Scientific School, New Haven, Conn.

J. Sam Coupal has severed his connection with the Mollie Gibson Mining Company, at Parral, and has been appointed manager of the United Mining and Development Company, of Boston, Mass. He is starting for that company the development of its Santa Lucia mine in the San Carlos district, Oaxaca, Mexico.

William C. Morris has retired from the presidency of the Laclede-Christy Clay Products Company and has been made chairman of the executive committee. Mr. Morris will spend some time in southern California before resuming active duties. James Green is chairman of the board of directors and John L. Green becomes president. Richard D. Hatton, vice-president and treasurer, and Montague Lyon, secretary and counsel.

OBITUARY

Dr. F. A. Kjellin, the inventor of the induction electric furnace which bears his name, died Dec. 30, 1910, aged 38 years. He was educated at the Royal Technical Institute, in Stockholm, graduating in 1893. In 1899 he began his work on the induction furnace at Gysinge. For some years he had been consulting engineer in the electrometallurgical department of the Swedish Gröndal-Kjellin Company.

John T. Fanning died at Minneapolis, Minn., Feb. 5, aged 74 years. He was born at Norwich, Conn., and for some years practised his profession in Massachusetts and New Hampshire, but had lived in Minnesota for 30 years. He was widely known as a hydraulic engineer. The St. Anthony Falls water power in Minnesota and the large dam across the Missouri at Great Falls, Mont., were designed and built by him, as well as many minor works of the same class.

Louis R. Alberger, president of the Alberger Condenser Company and the Alberger Pump Company, died Jan. 31 at his home in New York. He was born in Buffalo, N. Y., 1864, and was one of the best known specialists in the country on pumping machinery and condensing apparatus. After attending Yale University he went into business with his father, J. L. Alberger, who was engaged in the manufacture of vacuum-process specialties used in the salt industry. In 1887 Mr. Alberger became connected with Henry R. Worthington, whose large pump works at Harrison, N. J., later became a part of the International Steam Pump Company's holdings. He left the Worthington organization in 1901, when he formed the Alberger Condenser Company and acquired an existing plant at Newburgh, N. Y. Shortly afterward he formed the Alberger Pump Company.

SOCIETIES and TECHNICAL SCHOOLS

Appalachian Engineering Association—The annual meeting will be held at Pottsville, Penn., Feb. 24 and 25. Baird Halberstadt, of Pottsville, is in charge of the arrangements.

Montana Society of Engineers—The twenty-fourth annual meeting was held at Helena, Jan. 12 to 14. The proceedings included a visit to the smelting works at East Helena, and to other points of interest. Several papers were presented. The following officers were elected: President, Frederick W. C. Whyte; first vice-president, Robt. A. McArthur; second vice-president, John H. Klepinger; secretary and librarian, Clinton H. Moore; treasurer and member of the board of managers of the Association of Engineering Societies, Samuel Barker, Jr.; trustee for three years, Willis T. Burns.

Editorial Correspondence

Reports from our own Representatives on Important Events from Many Important Mining Centers of the World

San Francisco

Feb. 8—The petroleum producers of California should be satisfied with the prospect of remedial legislation indicated by the action of the lower house of Congress on Feb. 7 in the passage of the bill providing that patent to lands located or claimed under the mining laws containing petroleum or gas shall not be denied because of any transfer or assignment thereof by original locators to qualified persons or corporations prior to discovery of oil or gas. The further provision of the bill that the land included in the patent shall not exceed 160 acres should also be satisfactory. The ultimate enactment of this bill into a law will cure the evil of the Yard decision.

There is small chance for doubt that this step toward remedial legislation is directly, though not wholly, due to the visits to California of the Assistant Secretary of the Interior, the Director of the Geological Survey and Congressman Smith, of Bakersfield. In the decision on appeal, of the Bakersfield Fuel and Oil Company, Assistant Secretary Pierce held to the Yard decision, that a corporation in the eyes of the law is an entity, the same as an individual, and therefore more than one individual patenting an oil claim is entitled only to the number of acres to which a single individual is entitled. A quarter section of land in a proven or an unproven field is enough, as the practical oil man knows, and more than that acreage held by any individual or combination in one claim would work injustice to the independent operator of small or moderate capital who is incapable of handling a larger acreage to profitable advantage. To have reduced the area of a single patentable claim to 20 or even 40 acres would have been as unjust, and indicated a lack of wisdom and of knowledge of the vast difference between a gold placer and a petroleum prospect. It requires so little time and so small expenditure of money and labor to prove a gold placer compared with the outlay necessary for the actual discovery of oil or gas.

Last year the oil agency was enabled to present a bold front at the approach of the Associated and the Standard oil companies, by accepting the Union Oil Company, of California, into full fellowship. For a long time the Independents were at the mercy of the Standard and Associated, and compelled to take what price these buyers might offer. The Union was on high ground, and no flood of low prices could wreck it, or even move it from its position as a producer and seller, or buyer and seller. It was a tactful move when the Independents conceived the great benefit to be gained by taking in the Union. The Independent producers have 13,000,000 bbl. of oil on which they pay storage to the Union for 9,000,000 bbl., at the rate of 1c. per bbl. per month for steel storage and ½c. per bbl. for concrete storage. The Associated offers purchasing, or contracting to purchase 20,000,000 bbl. of oil at 41c. per bbl. The question of building storage rather than submit to the Union's storage rates, or the Associated price, was quite seriously discussed at a meeting in Bakersfield on Feb. 4, but the result of the discussion was wisely withheld from publicity. The cost of building storage is about 25c. per bbl., for steel, and about 11c. for concrete. Some of the members are hardly equal financially to such undertakings.

Anent the controversy between the California State mineralogist and the United States Treasury Department, Mr. Aubury has been informed through a letter from the supervising architect of the Department that there is an order which forbids the specifying of materials for Government buildings, and therefore his office cannot take any active part in promoting the use of any materials produced in California or elsewhere. He further states, however, that it is a matter of satisfaction to the office of the supervising architect whenever materials are submitted from localities in which structures are to be erected; and that should contractors for buildings in California, or any adjoining State, submit for approval any material produced in California which meets the contract requirements, it will be promptly approved. There is no doubt of the sincerity and truth of the claim of Mr. Aubury that hundreds of thousands of dollars have been paid for materials used in Federal buildings in this State, which have gone to outsiders.

Denver

Feb. 10—The labor lobby in the State legislature is working three eight-hour shifts. The Van Tilborg bill, which seeks to prohibit employers from demanding of their employees, present and prospective, that they renounce membership in labor unions and other organizations as a condition of employment, was passed on third reading, and the Cassaday bill was placed on third reading for final passage tomorrow. This latter, copied from the Illinois act of 1899, makes it a felony to bring workmen to Colorado under false pretenses, for the purpose of breaking a strike, or of taking the places of workmen locked out of employment. Under penalty of imprisonment, or a maximum fine of $2000, no person, firm or corporation can bring strike breakers into Colorado under armed guard. If the Von Tilborg bill passes the house, and is signed by the governor, it will prevent all such organizations as the Cripple Creek Mine Owners' Association enforcing the card system of employment of men. Organized labor is fighting hard for the passage of the Cassaday bill, the strike in the Northern coalfield being the main cause for its introduction. But there are grave doubts as to the constitutionality of both these bills.

Butte

Feb. 8—General Superintendent John Gillie, of the Anaconda Copper Mining Company, recently was called upon to testify before the legislative committee on mines and mining with reference to the sanitary conditions in the Butte mines. He appeared before the committee and gave some very interesting evidence regarding the problems which confront the mining companies in Butte. He stated that several years ago there had been a great number of pneumonia cases among the miners and that an investigation had shown one of the causes of this to be the fact that the miners when coming off shift were forced to go to their homes in the wet clothes they had worn while under ground. Accordingly the companies built change houses fitted with shower baths so that the men might return to their homes in dry clothing and this brought about a great decrease in the cases of pneumonia. The dust which is created by drilling and blasting it is practically impossible to do away with, although various devices such as breathing sponges, have been in use.

Mr. Gillie attributes the high temperature in some parts of the mines more to the oxidation of the mine timbers than to the depth which the workings have now reached. Some 75,000,000 ft. are used underground in the Butte mines yearly and in addition about 250,000 round timbers. These timbers start to oxidize as soon as they are put underground and though the oxidation is slow yet it is constant and the heat generated

by this vast amount of timber is considerable. Mr. Gillie stated that the companies are spending much money in running raises and crosscuts for ventilation purposes but frankly admitted that they were in a measure actuated by selfish motives since it has been their experience that where there is insufficient ventilation the cost of mining is high, owing to the fact that the men will not work well under such conditions. The legislative committee has yet to make its report public.

Salt Lake City

Feb. 9—The trouble developed recently between the foreign miners and the Independent Coal and Coke Company, at Kenilworth, Carbon county, has apparently been settled. The trouble is understood to have been caused by two or three Greeks, possibly labor agitators, complaining of an alleged shortage of weight in the coal mined, as a basis for striking for higher wages. The superintendent agreed to allow them to put on one of their own men to check the weights, but they refused to accept the offer, and about 150 Greek miners quit work.

On Feb. 6 many of the Greek miners stationed themselves along the incline, where the men going to work must pass, with the intention of preventing them from going into the mine. While the deputy sheriff, Thomas Crick, and one of his assistants were investigating the matter, his assistant, Thomas Jackson, was shot and killed. The Greeks, who were armed took to the hills, and fired into the town at the houses of the officials and American miners. The fire was returned. A special train with about 30 deputies and police was sent from Salt Lake in the afternoon. When a search of the hills was made, the Greeks could not be found, and are supposed to have disbanded at Helper and other camps. During the shooting two Greeks were killed and several wounded. Five were captured and the killing of deputy sheriff Jackson will be investigated. The Independent Coal and Coke Company proposes to get rid of Greek labor, though some Greeks not concerned in the affair will be allowed to return to work. The mine was closed Feb. 7, but work has been resumed, with half forces. The guard of special deputy sheriffs is still on duty, though no further trouble is anticipated.

Cobalt

Feb. 10—The Provincial government has consented to receive a delegation of those interested in the Montreal River districts who wish to urge the necessity for building a branch line of the Temiskaming & Northern Ontario Railway to Gowganda. The date for receiving the delegation is Feb. 15. The matter has been under discussion for some time and the determination of the government to build the branch into Porcupine has brought matters to a head. The government engineers have contended that the district was not sufficiently developed to warrant a railroad. The greatly improved conditions in Gowganda will, it is hoped, result in a change of sentiment.

Excellent progress is being made with the Porcupine railroad, and the right-of-way has now been practically cleared. The Porcupine end has been definitely settled, and the road will traverse the east shore of Purcupine lake. No decision has as yet been given as to whether the commission will establish a townsite.

Reports from Porcupine continue to be satisfactory, although with the exception of the transfer of claims, there have been no new developments of moment. Several options at large figures have lately been given to well known mining men, while the advent of Bewick, Moreing & Co. is probably the forerunner of others. Were it not for the extremely high prices asked by the owners of claims, there would be many more purchasers than there are. In too many cases the price asked is altogether out of proportion to the prospective value of the property, and purchasers are still further discouraged by the rapidity with which the payments are supposed to follow one another. The Dome has stopped all mining until the big rush of freight is over, and as they are bringing in a 40-stamp mill and cyanide plant this will take some time. Ground is being cleared for the mill, which will be built as rapidly as possible, and in the meantime every effort will be made to get in all the freight. The roads are in bad shape, and unless some action is taken shortly, they will be impassable by spring.

The Little Nipissing Mining Company is under a cloud, because a large amount of fraudulent stock has been put on the market. This company has a lease on Peterson lake, which has seven years to run. The capitalization is 1,500,000 shares, par value, $1, of which a quarter of a million was supposed to be in the treasury. Some of the records have disappeared and one of the stock books is missing, so it is as yet impossible to find out the exact number of shares fraudulently issued, but it is believed to be in the neighborhood of 200,000.

Johannesburg

Jan. 3—Last year closed with prospects for the mining industry that are scarcely as favorable as those which witnessed its beginning, but there is really no cause for discouragement. Lower-grade ore has been worked and dividends have been smaller while development has not invariably been good. The Vogel Deep, Cloverfield, Van Dyk and Grootvlei mines have closed down, and the Nigel mine which works an extension of the main reef to the south has been having troubles and appears to be in a serious position. The rich ore which was for many years mined by the Reitfontein company on the Du-Preez series north of the main reef has also apparently been exhausted, all of this tends to show that mining on the Rand has its serious risks as anywhere else. On the other hand developments on the East Rand Proprietary Mines, New Modderfontein, Modder B, Van Ryn and Brakpan mines have been favorable and the City Deep and Randfontein Central mines are this year starting up 800 stamps.

A serious shortage of native labor developed during 1910 and this is perhaps the main reason that the output and profits were not more satisfactory. A number of unskilled white laborers are employed on the various mines, principally in tramming, but the chief source of relief will be found in the more extended use of compressed air and rock drills in breaking rock. There are already over 3500 rock drills at work on the Rand and the number will shortly be increased as soon as the new central power station is available to supply air in bulk.

Mining is now better organized and conducted with more efficiency than ever before and though the conditions of work in many mines, as regards ventilation and the dust evil are still bad, yet artificial ventilation is being rapidly adopted and some success has been gained in the use of dust allayers or arresters of dust at the mouth of the hole. A new respirator, constructed on the baffle principle by Doctors Moir and Amyard and Mr. Koetze, Government mining engineer, promises to prove successful and to obviate that feeling of stuffiness that makes the usual forms of filter respirators almost impossible to use for any length of time. Unfortunately, partly owing to the high death rate in the past, really skilled and efficient miners are still in the minority and one manager recently remarked that he has never known good men to be so scarce. It is hoped that this state of affairs will in time be remedied by the spread of technical education and by the betterment of conditions for work. It has been announced that four mines, the Princess, Roodepoort, Central Deep, West Roodepoort Deep & Saxon, working the narrow South reef at Roodepoort at a high cost are to be amalgamated.

Christmas of 1910 was noted for the number of serious native intertribal riots which occurred at the various mines. Over a score of natives were killed and several hundred injured. Natives still suffer from the effects of the illicit sale of liquor which though it does not flourish as of old is still carried on, though the penalty is at least six months imprisonment without the option of a fine.

The Mining News

Reports of New Enterprises. New Machinery. Installations. Development Work and Property Transfers. The Current History of Mining

Alaska

Lon De Van—Considerable development work is being planned for this property on Cook's inlet. Work is under the direction of E. F. Moore, Ketchikan.

Alaska Industrial—Twenty thousand tons of ore were shipped during 1910. The property is on Prince of Wales island, and work is under the direction of Charles A. Sulzer, address Sulzer. Operations will be enlarged for the coming season.

Gold Stream—A. A. Wakefield, Ketchikan, manager of this property, is considering a plant for the treatment of its ores. Some ore is ready for shipment.

Rush & Brown—The lower level of this mine is to be unwatered, and considerable development work done. U. S. Rush, Kenai, is manager.

Alabama

Jefferson County

Tennessee Coal, Iron and Railroad Company—This company will begin very soon the construction of a new coal mine, to be known as Pratt No. 16 shaft. The shafts will be about 350 ft. deep, concrete-lined and of fireproof construction, with steel tipple and brick buildings and six-ton skip hoists. The daily capacity will be 3000 tons. The mine will be about 12 miles west of Birmingham, in the Pratt seam of coal, and about halfway between the new No. 13 Pratt shaft, now under construction, and the big dam, also under construction, and on the new branch of the Birmingham Southern Railroad. This mine will supply part of the coal for the by-product ovens now under construction near the new industrial city of Corey, where a large central coal washer will soon be built.

This company will also commence at once the erection of an emergency hospital at the Ensley steel plant.

Arizona

Gila County

Old Dominion—For the year ended Dec. 31, 1910, the company, on a production of 28,000,000 lb. of copper, or 7,000,000 lb. less than in 1909, earned about $450,000, or about the same as in the previous year. It disbursed $486,000 in dividends, the equivalent of $3 per share, which left a small deficit. Copper was produced at a cost of 10⅞c. compared with 11¼c. in 1909. The last six months of 1910 the cost was 9½c. compared with 10¾c. for the first six months. The company is treating its own ores exclusively. It is installing electric haulage in the lowest level of its mines, and is enlarging its concentrator capacity 100 tons per day.

Orphan—Stock is being sold to obtain money for churn drilling at the property near Miami.

Yuma County

Success—The first carload of ore has been shipped.

Stafford—This mill is in regular operation.

Winchester—Water supply is insufficient for the operation of this newly completed mill.

Mc. Entee—The sale of this property is reported.

California

Amador County

Argonaut—A 500-h.p. electric hoist will be installed.

Lincoln—A reservoir will be constructed upon the completion of the drainage of the 500-ft. level.

South Eureka—Two damage suits for $50,200 were filed in the superior court, Feb. 6, by two women whose husbands were killed in the shaft last winter.

Butte County

Further interest is being directed to the Forbestown district by the sale of three mining claims by J. A. Hartman to Charles L. Falck.

United States Diamond—M. J. Cooney, manager of this mining company, is arranging for renewed prospecting at Cherokee.

Burlington—The vein traverses the property for over one mile; it averages 6 ft. in width; in places over 23 ft. In the Jo tunnel a shoot is opened for 300 ft. in length and averaging 5 ft. wide. This tunnel is now 400 ft. in length. It is the intention to commence sinking a shaft on the property which is 23 miles from Oroville.

Leggett Gold Mining Company—J. H. Leggett, manager, is reported to have sold or leased his dredging interests to San Francisco capitalists.

Eldorado County

Landecker—This gravel mine is being reopened by the Hope Mining Company. Dr. B. E. Burger, Placerville, superintendent.

Limpinsel—John F. Limpinsel, a Placerville merchant, is clearing the tunnel which was driven 400 ft. by his father, and will extend it in the hope of crosscutting the ledge which has been prospected near the surface with favorable results.

Pacific—This quartz mine near Placerville which has been prospected to the 500-ft. level will be developed to the 700 ft. to determine size of mill required. Three shifts of men are employed.

Georgia Slide—Two eight-horse teams are employed hauling lumber and supplies to this mine near Georgetown.

Nevada County

The flumes and ditches supplying water for the Nevada City and Grass Valley mines put out of commission by the January snowstorm have been repaired and all the mines are again in full operation. The effects of the storm have attracted the attention of the Pacific Gas and Electric Company to the necessity for the construction of an auxiliary power plant, and there is strong probability that one will be established at Sacramento, which will serve to lessen the probability of mines being closed in Nevada and other counties another winter on account of storms interfering with power lines.

The production of the Grass Valley mines for the year 1910 is estimated at approximately $2,500,000, of which the North Star is credited with one-half, and the Empire nearly $1,000,000.

Interest has been renewed in the drainage-tunnel project conceived by Francis Burns several years ago, and since taken up by George Downey, of Nevada City. If carried out, the scheme would provide drainage of the big mines of Nevada City and Grass Valley through a tunnel extending from Rush creek at its confluence with Yuba river, and following the contact on which the gold-bearing veins are situated.

Town Talk—This mine, situated between the Union Hill and the Empire, will probably be bonded to Los Angeles and Eastern capital.

Placer County

Pioneer—This old mine in Humbug cañon, near Alta, is to be reopened by Jack Patrick and Harry Morris.

Alaska—George St. John, of Grass Valley, manager, reports a 3-ft. ore vein recently encountered in this mine.

Pittsburg—This mining company will

install a 10-stamp mill and a Blake crusher.

Coan—The two-compartment shaft will be sunk to 300 ft. on this property in Grass Valley district. Dan McGonigal, manager.

Winchester—A 6-stamp mill has been installed at this mine one mile east of Colfax.

SAN BERNARDINO COUNTY

Luckenbach—A cyanide plant is being installed at these mines near Daggett, under construction supervision of Bouldin & Millet, of Daggett.

Dennis Springs—W. H. Wallace, owner of claims at this place north of Daggett, is preparing for the installation of a gasolene hoist.

Calzona Mines—This mine, near Vidal, has recently shipped three carloads of ore to the Humboldt smeltery in Arizona.

Sanborn—This property, owned by Sanborn & Vaughn, is producing and shipping ore to the smeltery at Humboldt.

Steece Copper—This company is developing good copper prospects near Vidal.

Atolia—The two hoist houses of this tungsten mine in Rand district were destroyed by fire late in January, damaging the engines and causing a total loss of $2500 worth of property. New buildings will be constructed. Charles S. Taylor, Atolia, superintendent.

SHASTA COUNTY

Another mass meeting of farmers and business men took place at Redding, Feb. 4. Frank Gould, of San Francisco will complete his smoke tests within two weeks and 30 days thereafter the farmers may apply to the circuit court to enjoin the Balaklala company. It is expected that the judge will render his decision within another 30 days.

Evening Star—Edward C. Jacobs, of San Francisco, has brought suit against George Bayha, promoter, of Redding, and others for $15,000 as part of the commission for the sale of this mine, recently disposed of to a company formed in Germany.

SIERRA COUNTY

The recent unusually heavy snows have forced many of the mines in this district to temporarily suspend operations.

Independence—The Independence Gold Mining Company, with $500,000 capital, has recently been formed by Nevada City people for the purpose of operating this mine, which they have bonded.

Sovereign—Ore bins are being erected at this mine in Ladies cañon. F. O. Richardson, superintendent.

Willoughby—At this mine, above Downieville, a rich strike has just been made in the lower tunnel. E. L. Blincoe, owner.

Reir—James Salee, owner of this mine near Whitehouse, after completing the 300-ft. raise from the adit to the surface, has installed an electric hoist, and ore extraction has been resumed.

Bully Hill—The Winthrop mine of this copper company was closed down without notice on Jan. 31.

SISKIYOU COUNTY

Yreka Creek—Leland & Linscott, of Yreka, have bonded gravel claims, and propose putting on a dredge if the results shall warrant.

TUOLUMNE COUNTY

Tarantula—The development of this mine near Jamestown warrants 20 additional stamps.

Dutch—The 20-stamp mill is to be doubled in capacity within two months. Mr. Segerstrom, of Sonora, manager.

Colorado

BOULDER COUNTY

A tungsten- and gold-reduction plant is to be built at the mouth of Boulder cañon, by the Mining Association Mill Company.

CLEAR CREEK COUNTY

Unicorn—The Burleigh Mining and Milling Company has cut 6 in. of solid ore, high in silver and lead.

Pelican Mill—Eight tons of concentrates are being produced daily.

Central Colorado—Ore carrying gold and silver in veins 6 to 10 in. wide have been cut.

Capital Mines Company—The crosscut will be continued another 1000 ft. into the mountain, making a total of 6700 ft. W. N. Brady, of Washington, Penn., is the president.

Beaver—Several leasers are taking out $60 ore at this old mine on Chicago mountain; Thomas Egan, manager.

Princess Alice—It is reported that a 6-in. streak of free-milling gold ore of about $7.50 grade has been opened in this mine, on Grouse Mountain.

Josephine—Heavy shipments of silver-lead ore are being made from this mine on Kelso Mountain, in West Argentine. Settlements give from $55 to $60 per ton. The streak is 11 to 20 in. wide, and the the shoot 400 ft. in length.

GUNNISON COUNTY

Sandy Hook—This mine, at Ohio City, is getting out timbers for a 10-stamp mill to be put up in the spring.

LAS ANIMAS COUNTY

Cokedale—To the list of nine known dead, because of the explosion in the Cokedale mine, were added the names of E. A. Sutton, assistant superintendent, and Robert Meek, a volunteer rescuer, who lost their lives trying to reach missing men. Sutton overestimated the amount of oxygen in his helmet. He was alive when carried out, but died while efforts were making to resuscitate him with a pulmotor. Meek fell unconscious after venturing ahead of the air circuit, and died a few minutes after being carried out. Five bodies were found. Before the six missing men can be reached it will be necessary to put up more brattices, and enlarge the air circuit.

SAN JUAN REGION

Gold King—The mill is to be started at once for continuous operation.

Frank Hough—The shaft house has been burned down, entailing a loss of $175,000.

Pride of the West—Additional machinery has been installed, and 13 miners are employed on development work.

Yankee Girl—This mine, near Ironton, is producing 300 tons of high-grade silver-lead and copper ore per month.

Tomboy Gold Mines, Ltd.—The mill ran 29 days in January; crushed 10,000 tons of ore that yielded $31,500 in bullion and $34,000 in concentrates. The expenses were $40,500 and profits for the month $25,000.

SUMMIT COUNTY

Wellington—This company, operating at Breckenridge, has announced its first dividend of ½c. per share, amounting to $50,000.

Buffalo Gold Placer—Plans are being made for the construction of a dredge which will handle 6000 yd. per day.

Colorado Gold Dredging Company—This company will work its two plants at full capacity during the coming summer.

TELLER COUNTY

Half Moon—A new orebody has been opened in this Gold hill mine by William Klotz, lessee.

Mary McKinney—Shipments are going out regularly from the Grace Greenwood claim.

Anchoria-Leland—Leasers are at work in this Gold hill mine.

Cameron Townsite—Block No. 8 of the school section, under lease to Montaigne Brothers, is producing about five carloads of gold ore per week.

Free Coinage—Most of the leasers on this property, on Bull hill, are shipping milling and smelting ore.

El Paso—The output of this mine for January was 111 cars, 20 of which were shipped by the company, and 91 by leasers.

Ajax—The lessees on this mine produced 46 cars in January.

Wild Horse Mill—This mill is said to have treated 1000 tons of ore in January.

Isabella—A rich discovery is reported as having been made at grass roots on

the Comet, of this company, by G. Sahrbeck, lessee.

Dead Shot—A hoist is being installed on Rosebud hill, and the 114-ft. shaft will be sunk to 300 ft., and development carried forward from that point.

Gold Bond Consolidated—James Stewart, leaser on block 8 of this Gold hill property, is reported to have made a strike of 2 ft. of mill ore and 6 in. of high-grade gold ore.

Forest Queen—Shipments of a carload a day of $8 to $10 ore from the dump of the Forest Queen, on Ironclad hill, are being maintained.

Last Dollar—Thirty cars were shipped from this Bull hill property in January, returning about $30 per ton. Twelve sets of sub-lessees are at work under Knight & Carey, lessees.

Idaho

Coeur d'Alene District

Bunker Hill and Sullivan—Total disbursements to date are increased to $12,456,000 by the payment of dividend No. 161, amounting to $81,750; $163,500 has been paid so far this year.

Idora—Work on the intermediate drift on the level from the raise has progressed 90 ft. John Nordquist, Wallace, is manager.

Golconda—This mine has been consolidated with the Red Boy and operations resumed.

Indiana

Gibson County

Princeton—Work has been resumed with a full force after being shut down for a week for lack of a demand due to mild weather.

Kansas

Ottawa County

Quincy—Preparations for resumption of operations are in progress.

Big Jack—A gas engine has been installed.

Mission—A new gas engine is on the ground and work of overhauling the mill in progress.

Omaha-Petersburg—The new mill has been started.

Michigan

Copper Region

Wyandot—The new shaft at the northern part of this property is 65 ft. deep; the first crosscut has been driven to the lode, showing it to be about 35 ft. wide.

Ojibway—The crosscut from the 1500-ft. level of No. 1 shaft has cut the Kearsarge lode where it is 30 ft. wide; drifting has been started southward toward No. 2 shaft.

Indiana—The shaft is down 40 ft. in a clay formation; the steel for lining is on the ground and as soon as sufficient depth has been reached the reinforced concrete lining will be put in.

Senter-Dupee Development Company—Bedrock has been reached with two diamond drills; considerable difficulty was experienced in getting the sand pipe down to the ledge, owing to the presence of boulders.

Franklin—A crosscut is being driven from the 31st level of No. 1 Pewabic shaft on the Pewabic lode, a distance of about 70 ft. The steel shaft house, formerly at No. 1 shaft on the conglomerate lode, is being moved to this shaft, and the erection of the necessary foundation for the hoisting equipment is under way.

Ahmeek—All shipments to the Tamarack-Osceola mill have been discontinued, as the third section of the stamp mill is completed. The fourth section will be ready for service March 1. The mill is now crushing 1700 tons of rock daily.

Adventure—The sinking of the vertical shaft to cut the second of the series of lodes is being continued. A crosscut toward the hanging-wall may be driven to expose lodes 2 and 3 before they are reached by the shaft. The first lode was cut at a depth of 950 ft., and it is estimated that the second will be reached at 2200 feet.

Mayflower—Drill hole No. 11, which was put down at an angle in the center of the tract, cut a copper-bearing amygdaloid lode about 25 ft. wide.

Iron-Menominee Range

Carpenter—The M. A. Hanna Company, of Cleveland, has added the Carpenter lands to the tracts it has under option in the Crystal Falls district. The property is in section 31, 43-32. It will be thoroughly explored and for that purpose a diamond drill already is in operation. Professor Carpenter, of Chicago, is the principal owner of the fee, interested in which are a number of persons, among them Benjamin J. Neely, of Negaunee. By acquiring the Carpenter tract the Hanna interests now have several promising parcels of mining lands in that immediate vicinity. The company a few months ago secured an extended lease on the Monongahela and the Revena properties. The Revena is 1½ miles from the Monongahela, and the Monongahela adjoins the Carpenter on the north. A large deposit of ore already has been proved up at the Revena and shaft sinking is in progress.

Escanaba Development—The Company is organized to explore a tract of iron-ore lands near Iron River. The officers are C. W. Kates, president; Daniel J. McRae, vice-president and general manager and Dr. C. B. J. Kitchen, secretary and treasurer. Diamond drill work is to be started at once to determine the depth and thickness of the ore.

Marquette Range

The Geary and Powers Exploring Company, which has been drilling for some months past on the Aronson lands, east of the Konwinski mine, has found ore at a depth of over 400 ft. from surface. The indications are that the ore extends across the property, for a width of not less than 600 ft., but the overburden is deep..

Republic-Sherwood—The Republic Iron and Steel company has taken an option on Sherwood property, south of the James mine. Ore was found three years ago, when a few shallow drill holes were put down. It is said that ore 40 ft. in depth was encountered in two of the holes, which were sunk on an angle of 60 deg. on opposite sides of the Konwinski road.

Minnesota

Iron-Mesabi Range

Longyear—A contract for stripping at this mine, in the Hibbing district, has been let to Butler Brothers, of Minneapolis. The contract is a large one, involving the removal of approximately 3,500,000 cu.yd. of material. The Longyear is controlled by the Interstate Mining Company, which is the Mesabi division of the Jones & Laughlin Steel Company. The property adjoins the Morris on the South and the Webb mine on the east, and it was originally opened as an underground proposition. The mine has been idle much of the time since 1905. It contains a large body of ore.

Vermilion Range

Vermilion Steel and Iron—This company, is sinking a shaft 6x14 ft. in the clear, and has reached a depth of about 120 feet.

Irona Mining—The company is exploring the property with a diamond drill. The first hole, driven at an angle of 70 deg., cut 12 ft. of commercial ore at a depth of 192 feet.

White Iron Lake—The company has started underground work again. At a depth of 160 ft., drifting is being done from the shaft to reach the ore found by a drill at a depth of 300 feet.

Hill Property—M. H. Alworth, of Duluth, has recently started exploration work on the Vermilion Range.

Montana

Butte District

Butte and Superior—A statement compiled Nov. 30, shows $2,217,045 expended in the purchase of the property, equipment and development. The indebtedness of the company was $527,764, exclusive of $84,500 outstanding second mortgage bonds. There are $150,500 first mortgage bonds, which became due Jan. 1; arangements have been made for extension of these bonds for another year. In the above indebtedness is included a loan from the American Metal

Company of $147,706, which can be paid at the rate of $1 per ton of ore mined. The net profits of the year are given as $110,676. During December the output was increased from 380 to 500 tons daily, and will be increased to 600 tons.

North Butte—Production for Jan. is estimated about 2,000,000 lb. copper. The Speculator shaft is being sunk from the 2200-ft. level to the 2900 level. The shaft is now down 2640 ft., and should reach the 2900-ft. within four months. Crosscuts will be run on the 2400,- 2600- and 2800-ft. levels to the Edith May vein. Development has resulted in reducing costs from 10½c. for the first six months of 1910 to 9½c. for the last six months.

Butte Central Copper—A contract to sink the three-compartment shaft on additional 500 ft. was awarded recently. The ore on the upper levels is being mined for its silver and gold.

BROADWATER COUNTY

Ohio-Keating—The board of directors has recently leased the property.

FERGUS COUNTY

North Moccasin—The company's property comes up for sheriff's sale in March; the Kendall and the Barnes-King companies will probably bid.

JEFFERSON COUNTY

Corbin Copper—This company recently made a shipment to the Washoe smeltery of the Anaconda Company of a carload of ore from the Rosalie tunnel which returned 9.15 per cent. copper, 25.08 oz. of silver and 90c. in gold to the ton.

LINCOLN COUNTY

Haxel T.—Machinery for the new concentrator is now being hauled to the mine.

Boston & Corbin—The sump below the 1200-ft. level has been completed and the work of cutting a station at that level begun, after which the orebody will be drifted upon. Plans for the erection of a concentrator in the spring are being discussed.

Amazon-Montana—The crosscut on the 350-ft. level has cut the main vein 200 ft. from the shaft, and 5 ft. of ore disclosed.

Nevada

ESMERALDA COUNTY

Tonopah-Belmont—The local management emphatically denies the statement published in a San Francisco paper that treasury stock is being sold in the market.

HUMBOLDT COUNTY

National—John E. Pelton, president of the company, has on exhibition a 96-lb. piece of ore assaying $50 per lb. that was broken from a 276-lb. boulder. The mine is producing $125,000 net profit each month and in eight months has paid in dividends 60 per cent. of the par value of the stock.

Esperando Gold Mining Company—This new company owns the Nevada State group of claims on Three Mile creek in the National district. W. B. Strang and A. F. Hunt, Jr., of Kansas City, are interested.

LANDER COUNTY

George Abel has recently bonded his silver-lead property, 28 miles from Battle mountain, to Pittsburg men.

NYE COUNTY

Montgomery-Shoshone—The annual report of the company showed net proceeds of bullion sales $245,907; the net profits, before deduction for depreciation, interest and administration expenses, was $867; the total number of tons mined and milled were 61,037; the average gross value per ton was $4.84, and the average percentage of recovery was 83.57. The cost of mining and milling was $4.01 per ton. The report states that while a large amount of ore has been handled, the grade has been so low that the cost of mining and milling has been practically the same as the net proceeds of the operation, without deduction for depreciation, administration expenses and interest.

A comparison of 1910 with 1909 shows the following changes in the financial condition of the company: Decrease in net current and deferred assets, $6553; increase in loans payable and accrued interest, $20,371; total, $26,924; written off for depreciation less addition to plant, $28,726, making a total loss of $55,360.

STOREY COUNTY

Yellow Jacket—The regular annual meeting was held Jan. 25. Directors representing Edward B. Sturges interests were unanimously elected as follows: E. B. Sturges, B. F. Shaw, George S. Sturges, Henry K. Shaw and Franklin Leonard, Jr.

Crown Point—The directors reëlected at the recent annual meeting are : Edward B. Sturges, George S. Sturges, B. F. Shaw, F. H. Swan and Henry K. Shaw. George S. Sturges is president and superintendent; B. F. Shaw, vice-president, and F. H. Swan, secretary.

Mexican—The recent strike on the 2500-ft. level has widened to 10 ft.; high assays are obtained.

WHITE PINE COUNTY

Ely Consolidated—In sinking the Zack shaft to the 500-ft. level a vein was cut 5 ft. wide. Below this vein the shaft is said to have passed through porphyry ore.

Princess—The Princess Copper Company has been organized for the purpose of taking over the property of the Ely-Resurrection Company, recently sold at sheriff's sale.

Oregon

BAKER COUNTY

White Swan—The property has been bonded and will be known as the Susan D. The mine is now full of water, but is to be pumped out. Operations will start at once. The mine is near Baker.

Bohemia—Some high-grade ore has been encountered on this property near Baker; five more stamps are now in operation.

Listen Lake—Preparations are being made to operate this mine, near Greenhorn, on a more extensive scale. Some new machinery has been installed.

COOS COUNTY

Big Jewel—A large sum will be expended for a ditch and flume on this property near Brandon. The mine is to be reopened.

Texas

The Legislature is now in session. A new mining law for the State is being prepared. There is movement on foot to establish a school of mines at El Paso, to be supported, in part, by the State. The Bureau of Economic Geology and Technology is trying to secure an appropriation for field work. At present no money for that purpose is available, and, unless an appropriation is made, it is feared that the work on the fuel of Texas may have to be curtailed for lack of funds.

Utah

JUAB COUNTY

Tintic shipments for the week ended Feb. 3 amounted to 131 cars, including one car of concentrates from the May Day mill, and two cars of slag from the Tintic smeltery.

Yankee Consolidated—The annual report showed receipts during the last year to have been $89,929 from assessments, and from other sources, $23,200; operating expenses, $79,461. An overdraft of $23,279 outstanding from the year previous was paid. There was a balance of $10,388 on hand Jan. 1, 1911.

Chief Consolidated—The second annual report has been sent to stockholders; receipts, including cash on hand, $108,788. The disbursements, including purchase of mining claims, hoist and equipment, were $242,469, leaving cash on hand Jan. 1, 1911, of $45,569. During the year, 6947 tons of ore were shipped, which brought $177,639. The net profits from these shipments were $66,448, or $25.57 per ton.

Grand Central—An orebody has been opened between the 2000- and 2100-ft. levels, which is said to be 1200 ft. in length, and up to 50 ft. in width.

Beck Tunnel—Ore is reported to have been cut in the drift, which is being driven toward the Uncle Sam.

Gold Chain—On the 400-ft. level ore has been opened for 250 ft., and is up to 25 ft. in thickness.

Iron Blossom—The lead-silver ore, which is being developed by raising from the 500-ft. level, is widening.

Crown Point—Drifting to the east is being done from the 250-ft. level of the new shaft.

Mammoth—Development is being done on several levels. About 70 men are employed.

Selma Mines—This company, owning claims in North Tintic, has been reorganized. An 800-ft. tunnel has been driven, and a winze sunk.

Lower Mammoth—Leasers are shipping from the 1700-ft. level and marketed a car of 35 tons recently, which brought $812.

Dragon Iron—A special meeting of stockholders of this and of the Governor Company has been called for March 2, for the purpose of considering a consolidation between the two companies.

Bullock-Tintic Empire-Tintic Combination—Stockholders' meetings of these companies have been called for early in March, to vote on the question of a merger to be known as the United Tintic Mines Company.

Eureka Hill—A force of men under F. J. Hansen and D. Campbell are taking out the old iron by contract at the Eureka Hill mill, and cleaning up amalgam and quicksilver.

McKinley—A meeting of directors was held Feb. 9 to consider the question of resuming work.

Utah Mine—The question of using a traction engine for hauling ore from Fish Springs to the railroad at Oasis is being considered.

Colorado—Recent developments in unexplored ground north of the Sioux line indicate there will be good tonnage here, much of shipping grade. Ore from 10 to 12 sets in width has been opened from which assays of $5 in gold, 20 per cent. lead and 40 oz. in silver have been obtained. On the 250-ft. level 700 ft. north of the Sioux is a large stope in silicious ore, parts of which are of shipping grade.

Columbus Consolidated—Operations are still confined to the tunnel level in search of new ore. About 20 miners in addition to leasers are working .

Columbus Extension—Ore shipments are said to average about $20 per ton. The ore comes from the West drift, and has been followed for 75 ft. A recent shipment of 70 tons assayed 0.085 oz. gold, 7.1 oz. silver, 8.11 per cent. copper, 32.5 per cent. iron, and 10.8 per cent. silica.

South Hecla—The Wedge fissure, which has been followed 340 ft., showing a small streak of ore most of this distance, has widened out to 4 ft. of ore stated to be of shipping grade, and has been drifted on 20 feet.

American Flag—Ore is being mined and shipped from the fourth, sixth, seventh and eighth levels. The new workings and tunnel level have been connected, providing better ventilation.

Little Bell—The mill has been closed down until spring, on account of a shortage of water. Shipments for the week ended Jan. 27 amounted to 23,000 lb. The mine is being operated as usual.

New York Bonanza—The drift on the 900 level has been following ore for 60 ft. The fissure shows 18 in. of shipping ore at the face.

Salt Lake County

Utah Consolidated—It is proposed to sink from the 700- to the 1000-ft. level, and a station is being cut on the 700 for this purpose.

Bingham Copper—A fissure carrying galena ore has been cut in a drift from the tunnel level.

North Utah—It is reported that this company has been unable to sell bonds with which to carry on development, and that a receiver has been appointed.

Montana-Bingham—Two feet of sulphide ore has been cut in a drift from the main tunnel. Three cars have been mined and are ready for shipment.

Ohio Copper—During January the daily average of ore milled is reported to have been about 1600 tons, or in the neighborhood of 50,000 tons for the month.

Copper Bank—Articles of incorporation have been filed by this company, which takes over a group of six claims in Big Cottonwood. H. T. Rasmussen is president.

Washington

Ferry County

International—This company has advertised for bids for the sinking of a 50-ft. shaft, and development work is to be started at once. Larry Hughes, Orient, is manager.

Washington & Ohio—This company will start development work at once on its property, at Bossburg. Considerable money will be spent.

Beecher—At the annual meeting of this company, J. W. Rickers was elected president, E. C. Ward, superintendent and C. E. Young, secretary, all of Orient.

Kittitas County

Black Hawk—New machinery is to be installed on this property, which is said to have copper ore of a high grade. E. R. Peterson, Seattle, is president of the company.

Stevens County

Larson Lead—This property is owned by Jens Jensen and Lewis P. Larson, of Metaline Falls, who are considering the installation of a 1000-ton concentrator.

Canada

British Columbia

Granby Consolidated—The operating profits for the calendar year 1910 are estimated at $460,000, or $3 per share on 148,000 shares outstanding. The cost of smelting averaged $2.50 per ton and for the latter months of the year was $2.39. Copper production was 20,018,048 lb.; silver, 355,997 oz.; gold, 44,130 oz. Gross receipts, $3,635,191; expenses, $3,174,799; net profits, $460,392.

Ontario

Algomah—The drift on the 104-ft. level has a length of 550 ft. with no change in the character of the ore. A third drill hole is being put down about 1000 ft. beyond hole No. 2 to the west of the shaft.

Ontario—Cobalt

The shipments from Cobalt for the week ended Feb. 3 were: La Rose, 237,240; Coniagas, 215,830; Temiskaming, 75,465; Right of Way, 64,670; Nipissing, 62,200; Buffalo, 60,900; McKinley-Darragh, 50,906; Trethewey, 42,000; total, 809,265 pounds.

Beaver—The best shoot of ore yet discovered on this Cobalt property is now being opened up on the 300-ft. level. It is expected that a dividend will be declared.

Hudson Bay—This company has relinquished its option on the Foster-Ellis claims in Porcupine.

Hargraves—The annual statement showed total receipts, $102,421; expenditures, $58,800. Ore on hand, $37,612. The total production was 625 tons, valued at $117,400 gross.

F. & H. B.—Another dividend of 300 per cent., payable Feb. 13, has been declared.

Agaunico—This company's plant has been destroyed by fire.

Temiskaming—Bonanza ore has been struck at a depth of 537 ft. in a winze from the 500-ft. level. This is the deepest working in Cobalt, and the strike is of great importance on account of the fact that the developments at 500 ft. were disappointing.

Black Consolidated—Work is to be resumed on this property.

Swastika—The discovery of good gold values on the 100-ft. level has caused a considerable rush of prospectors to the district, which is 70 miles north of Cobalt, on the Temiskaming and Northern Ontario Railway.

Keeley—Sufficient men have been secured to break the strike and resume operations on this South Lorrain property. An engineer will be engaged to examine the mine and report on its value for the benefit of the creditors of the defunct Farmers' Bank.

Buffalo—The mill report of this property for December, 1910, shows that 4154 tons, assaying 36.4 oz. per ton, were treated, and 125,220 oz. of silver were recovered, an increase of 37,954 oz over the previous month.

Wettlaufer—Reserves in this South Lorrain mine are estimated at between 3,500,000 and 4,000,000 oz. No stoping has as yet been done, all ore shipped having come from development.

Kerry—Work on this Peterson Lake lease is to be resumed.

La Rose—Vein No. 8 has disclosed high-grade ore; a stope is now being opened on the second level and has reached a hight of 16 ft. In the back the ore shows for 50 ft. Of the production of $247,000 in November and December, nearly all came from this stope, from an area 50x16 ft. One mill parcel weighed 29 tons, and assayed 5800 oz. per ton.

ONTARIO—PORCUPINE

Messrs. Pope and Kuehn, engineers in the employ of Bewick, Moreing & Co., are at work in the Porcupine camp and have looked over a number of properties, in advance of the arrival of C. A. Moreing and others associated with him. The inspection has been carried on quietly to avoid interviews with the large number of prospectors anxious to dispose of claims.

Harry Bush, of Rossland, predicts a great rush to the Porcupine camp this summer, and believes the greatest wildcatting campaign in mining history will ensue.

Armstrong-McGibbon—High assays in gold are being obtained from No. 1 shaft. A diamond drill is working on this property and several holes will be put down to test the vein at about 100-ft. depth.

Rea—High assays from the cores from the drilling operations are being obtained.

Vipond—This property has produced its first gold bar from a one-stamp mill. Underground developments are progressing satisfactorily.

Porcupine Imperial—This property will install a complete plant, including a compressor.

SASKATCHEWAN

There is a rush to the oil area near Morinville, Saskatchewan, where a large number of companies are anxious to operate. Over 100 locations, of one square mile each, have been leased by the Canadian government. Sixty companies have been incorporated this week by the Alberta government and other applications are pouring in.

Mexico

El Oro—Mill ran 29 days in January; crushed 30,020 tons of ore; yielding $199,070 bullion; working expenses, $93,690; expenditure on development, $24,750. Profit was $80,630; profit on railway, $7000; total profit, $87,630. Expenditures on improvements, $2890.

CHIHUAHUA

Alvarado and Palmilla—The Palmilla Milling and Alvarado Consolidated Mines Companies have been consolidated into a new company known as the Alvarado Minning and Milling Company; office 60 Congress street, Boston, Mass.

Mina Maria—A 38-ton carload of 2-kg. silver ore was shipped from this mine in Roncesvalles to the smeltery at Torreon. R. J. Ward is in charge.

SONORA

Transvaal—An orebody, 90 ft. thick, has been disclosed by churn drilling.

South Tigre—Plans for a resumption of exploration work are under way.

La Mina Prieta—A 5-stamp mill and a small power plant have been set up at this mine, near Alamos.

El Tigre—This company's transmission line from Douglas, Ariz., is being rapidly constructed. It will be 66 miles in length and will cost more than $150,000.

Philippine Islands

BATAN DISTRICT

Four coal cutters are being installed at the Batan coal mines. Arrangements have been completed to handle 300 tons of coal per day.

BENGUET DISTRICT

The Benguet Consolidated reports 130 oz. gold for November. The installation of the Headquarters plant is progressing and development work continues.

The opening of the two good leads on the Bonanza, which lies east of the Headquarters, is reported.

NUEVA ECIJA DISTRICT

There is much interest in the placer deposits of this new district. About 2000 hectares have been so far tested by boring, with encouraging results. W. S. Begg, an engineer representing Australian capital, recently arrived from Sydney to examine the ground of the Rio Chico Gold Dredge and Mining Company, whose holdings cover over 1000 acres on the Rio Chico and Rio Cabu.

It is also understood that another Australian group is negotiating for other properties on the Cabu and it is expected that a dredge will soon be ordered.

PARACALE DISTRICT

The *Far Eastern Review*, of Manila, reports that the examination of the Paracale Extension property by R. V. Hanlon, a mining engineer from Korea, has been in progress. This ground was formerly experted by Mr. Kane, whose report placed the average values at 1.05 pesos per cu.yd. It is understood that plans for a dredge have already been completed by two Australian experts, familiar with conditions in the district, and that if Mr. Hanlon's report is favorable its construction will be promptly undertaken.

The Paracale Gold Dredging Company's stamp mill, recently arrived to handle the rich boulders found on the ground, will soon be in operation. The installation of a second dredge is being considered by this company.

In November 73 oz. of gold were received at Manila from the Philippine company's dredge representing 11 days' saving.

SAN MAURICIO DITRICT

The San Mauricio mine and mill have been closed down, in consequence of the flooding of the mine by the torrential rains around Mambulao. The pumps were insufficient to handle the water. Just before the flood a shipment was made of 125 oz. gold and 135 tons of concentrates.

ZAMBOANGA DISTRICT

The discovery of coal deposits is reported near Margosatubig. The district is on the island of Mindanao, in the Moro country.

Africa

TRANSVAAL

Cable advices report the gold production in January at 651,027 oz.—or $13,456,725—an increase of 49,659 oz. over January of last year.

Australasia

WESTERN AUSTRALIA

Gold production in January is reported at 119,498 oz.—or $2,470,024—a decrease of 7853 oz. from January of last year.

NEW CALEDONIA

Official reports give the number of men employed in the mines of the colony in 1909-10 at 2355 whites and 2266 colored men, a total of 4621. The number of days worked was 503,656, showing an average employment of 109 days. Of the total number 4109 were employed in the nickel mines. The colored men include Arabs, Javanese, New Caledonians, Kanakas and negroes. The white men include a number of convicts.

South America

BRITISH GUIANA

Exports of gold from the colony for the 12 months ended Dec. 31 were 64,977 oz. bullion in 1909, and 57,022 oz. in 1910; a decrease of 7955 oz. The bullion reported in 1910 was equal to $971,345, or 46,993 oz. fine gold. Exports of diamonds in 1910 were 3808 carats, valued at $30,946; a decrease of 1838 carats.

The Markets

Coal Trade Review

New York, Feb. 15—Coal trade in the East is generally dull, the chief cause being a rather light demand for steam coal. A better demand from manufacturers is looked for, and most dealers are hopeful.

In the West conditions are not improving and reports come from all quarters of oversupply and resulting low prices. There seems to be no remedy except a curtailment of production and shipments—unless there should be a large increase in demand, which is not now expected.

Proposed Consolidation—There are reports of a plan to consolidate all the coal mines in Illinois south of Springfield under one management; or to put the selling of their coal in the hands of one corporation. There are so many conflicting interests, however, that any such arrangement seems highly improbable.

Coal Traffic Notes

Coal tonnage originating on lines of Southern railway, 11 months ended Nov. 30 was: Tennessee district, 1,104,915; Alabama district, 2,836,536; total, 4,940,451 short tons, an increase of 1,545,191 tons over the previous year.

Coal passing through the locks on the Monongahela above Pittsburg, year ended Dec. 31, was 9,736,666 short tons in 1909, and 9,460,695 in 1910; decrease, 275,971 tons.

Coal shipments out of Great Kanawha river in West Virginia, year ended Dec. 31, were 1,229,660 tons.

Coal passing Davis Island dam on the Ohio, year ended Dec. 31, was 2,466,710 short tons in 1909, and 1,774,760 in 1910; decrease, 691,950 tons. The large decrease was due to the unusually long stage of low water in the Ohio.

Shipments of Broad Top coal over the Huntingdon & Broad Top railroad in January, were 58,281 tons in 1910, and 59,987 in 1911; increase, 1706 tons.

Coal and coke tonnage of Virginian railway, six months of fiscal year from July 1 to Dec. 31, short tons:

	Commercial.	Company.	Total.
Coal	1,017,780	84,328	1,102,108
Coke	10,002	.....	10,002
Total	1,027,782	84,328	1,112,110
Total, 1909	414,408	.....	414,408

The road was only partially completed in 1909, and not fully open for traffic.

New York

Anthracite

Feb. 15—The trade is rather quiet. Domestic sales are not heavy. Steam trade is improving a little. Most of the collieries closed down from Thursday or Friday to Tuesday of this week.

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

Schedule prices for domestic sizes are $4.75 for lump, $5 for egg and stove and $5.25 for chestnut, all f.o.b. New York harbor. For steam sizes current quotations are $3@3.25 for pea; $2.40@2.75 for buckwheat; $1.95@2.25 for buckwheat No. 2 or rice; $1.40@1.55 for barley; all according to quality, f.o.b. New York harbor.

Bituminous

The soft-coal trade remains dull, and dealers are all complaining. New England buying is light, and harbor trade is spasmodic and irregular.

Prices are nominally about the same. Gas coals bring $1@1.10 at mine for ¾-in., 95c.@$1 for run-of-mine, and 70c. for slack. Fair steam coals can be had for $2.60, f.o.b. New York harbor, lower grades down to $2.35@2.45, with better coals up to $2.85@2.90. There is a surplus of coal at tide, and some steam coal has been sold as low as $2.05@2.10 to avoid demurrage.

Car supply is abundant and transportation fairly regular.

In the coastwise trade vessels are in a little better supply. Rates are still irregular, but tonnage can be had at 75@85c. from Philadelphia to Boston or Portland; 60@70c. from New York around Cape Cod, and 40@50c. to Sound ports.

Birmingham

Feb. 13—Coal contracts held by operators in Alabama and other Southern States require steady operation of the mines. The output in Alabama is heavy and there is nothing in sight that looks like any interference with the conditions. The spring-like weather throughout the Southern territory during the past month has not hampered the coal trade.

Considerable development is on in Alabama. The Alabama Fuel and Iron Company is pushing the work on a new mine, while the Tennessee company hardly has the work on one big mine fairly under way before announcement is made that another will be started. Frank Nelson, Jr., and associates, who some time back purchased coal lands in this State from the estate of Joseph Bryan, of Virginia, are now making preparations for an active development of this property and the opening of several new mines during this year. The Pratt Consolidated Coal Company will do some development work also.

Chicago

Feb. 14—The coal market continues to be depressed, in the absence of cold weather. Domestic coals, particularly, suffer, and Western is in worse condition than Eastern. Screenings show the nearest approach to strength, being a popular mild-weather fuel for steam purposes. Lump from Illinois and Indiana mines is weak. Shipments have been lessened, by many operators, yet the sum total continues to be too large for ready consumption by the market. A good deal of coal has been sold at very low prices to escape demurrage charges. Under these circumstances prices are not likely to hold firm or to recover losses, and operators should be cautious about sending any kind of coal to this market.

Illinois and Indiana coals bring $2@2.50 for lump, $1.65@1.75 for run-of-mine and $1.55@1.75 for screenings, in car lots. Of coals from east of Indiana the strongest is probably Hocking, which has been well kept down as to quantity, in general, with occasionally a shipment sold at 10 or 20c. less than the standard price of $3.15. Smokeless is very weak, lump selling for $3.30@3.65 and run-of-mine for $3.05@3.30. Anthracite is moving slowly and in small lots, with all sizes plentiful and chestnut most in demand.

Cleveland

Feb. 13—Steam-coal demand is improving. Domestic trade continues slow, but the market on the whole is in better shape than it has been. Car supply is good. Few mines are working on full time. Prices are unchanged.

Indianapolis

Feb. 13—The coal trade is a little more active; but a number of mines are still running on short time. From Chicago, especially there are complaints of oversupply. Conditions will not improve while this state of affairs continues.

Edward Barrett, Indiana State geologist, has appointed Frank I. Pearce, of Brazil, chief inspector of mines, to succeed James P. Epperson who has held the position for the past eight years. Mr. Pearce received the highest grade at the recent competitive examination for the office. He is a practical miner with 17 years in the mines. The appointment is meeting with commendation by both miners and operators. He will enter upon the duties of the office March 1.

Pittsburg

Feb. 14—The coal market continues very unsatisfactory, mines running at only about 50 per cent. and prices being cut as deeply as ever. Mine-run has sold at less than $1 a ton in a number of cases, and there is no regular market. We quote prices, largely nominal, as follows: Mine-run and nut, $1; ¾-in., $1.10; 1¼-in., $1.20; slack, 82½*a* 85c. Prices on slack are well maintained as the demand is steady and production of slack is reduced on account of mines running such short time.

At a meeting of the Pittsburg Chamber of Commerce Feb. 9 the report of the traffic committee, to the effect that the railroads are grossly discriminating against Pittsburg and in favor of certain West Virginia and other districts, in coal rates to the lakes, was accepted and filed. There was a long parliamentary battle, the leaders on one side desiring to have the report rejected, and those on the other side to have it adopted. The action to receive and file was had as a compromise. It is claimed that the complaint already made by private individuals to the Interstate Commission will receive attention within a fortnight to the extent of the commission hearing at least part of the testimony.

Connellsville Coke—There is a report that a furnace interest has closed for coke for second half at $1.75 but the report is not fully confirmed. Prompt coke is slightly firmer, and only odd lots can be picked up at $1.45, while it is improbable that contracts could be made at $1.50, although this price was under discussion a fortnight ago. We quote former prices, except that we advance the minimum on contract furnace coke 5c.: Prompt furnace, $1.45@1.50; contract furnace, $1.55@1.60; prompt foundry, $2@2.10; contract foundry, $2,25@2.50, per ton at ovens.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Feb. 4 at 291,705 tons, a gain of 4000 tons, and shipments at 3037 cars to Pittsburg, 4772 cars to points west and 739 cars to points east, a total of 8548 cars.

St. Louis

Feb. 13—The coal market has been absolutely at a standstill. Nearly all of the fifth and ninth district mines have been shut down most of the past week. There is practically no coal moving on the open market; about all that is moving is coal that has been contracted for earlier in the season. Even contracts are not taking their full tonnage as nearly all steam plants are running half time and dealers on account of the weather are all backing off.

The Carterville district mines are running only about half time and insist upon forcing the products on the market at lower and lower prices. These mines instead of accepting the situation insist upon running and as a consequence not only is there a great deal of coal up to demurrage at the large reconsigning point, such as St. Louis, Peoria and Chicago, but all throughout the country in nearly every town some jobbers and operators have coal up to demurrage, which was shipped them on consignment.

Sales agents are getting desperate as there seems to be absolutely no relief in sight. Railroads and steam plants are all full to the guards and are not beginning to take their contract requirements. There is scarcely any price quoted on all sizes as 75 per cent. of the coal that has been sold in the last two weeks has been demurrage stuff, sold for what it would bring.

Current prices in the St. Louis market are as follows:

	F.o.b. Mine.	F.o.b. St. Louis.
Standard:		
6-in. lump	1.20	1.72
2-in. lump	1.00	1.52
Mine-run	0.90	1.42
2-nut	0.80	1.32
2-in. screenings	0.50	1.02
Pea and slack	0.25	0.77
Staunton, Mt. Olive & Springfield:		
6-in lump	1.50	2.02
3-in. lump	1.25	1.77
Mine-run	1.10	1.62
2-in. nut	0.80	1.32
2-in. screenings	0.60	1.12
Carterville:		
6-in. lump or egg	1.30	2.07
3-in. nut	1.20	1.87
Mine-run	1.20	1.87
1½-in. screenings	0.70	1.37
Franklin County:		
6-in. lump or egg	1.50	2.27
3-in. nut	1.40	2.07
2-in. nut	1.20	1.87
1½-in. screenings	0.70	1.37
Trenton:		
6-in. lump	2.25	2.77
6-in. egg	2.25	2.77
3-in. nut	2.00	2.52
Pennsylvania Anthracite:		
Chestnut	....	7.20
Stove and egg	....	6.95
Grate	....	6.70
Arkansas Anthracite:		
Egg or grate	....	6.25
Coke:		
Connellsville foundry	2.50	5.30
Gas house	....	5.00
Smithing coal	1.65	4.15
Pocahontas Smokeless:		
Lump and egg	2.25	4.75
Mine-run	1.25	3.75

Prices at East St. Louis are 20c. per ton below St. Louis quotations.

Anthracite—The market is very dull, as is also smokeless, though a little of both is coming forward. Prices on these coals are holding up fairly well, though very little tonnage seems to be moving.

FOREIGN·COAL·TRADE

German Coal Trade—Exports and imports of fuel in Germany, year ended Dec. 31, metric tons:

	Exports.	Imports.	Excess.
Coal	24,257,651	11,195,523	Exp. 13,062,128
Brown coal	62,440	7,397,719	Imp. 7,335,279
Coke	4,128,034	623,477	Exp. 3,504,557
Briquets	1,988,177	241,266	Exp. 1,746,911
Total	30,436,302	19,457,985	Exp. 10,978,317
Total, 1909	28,458,061	21,250,002	Exp. 7,208,059

The total increase in exports in 1910 was 1,978,241 tons; decrease in imports, 1,792,017 tons.

German Coal Production—Coal production in German Empire year ended Dec. 31, metric tons:

	1909.	1910.	Changes.
Coal	148,959,035	152,881,509	I. 3,922,474
Brown coal	68,356,173	69,104,867	I. 748,694
Total mined	217,315,208	221,986,376	I. 4,671,168
Coke made	21,407,676	23,600,362	I. 2,192,686
Briquets made	18,829,544	19,561,494	I. 731,950

Of the briquets reported in 1910 there were 15,120,255 tons made from brown coal or lignite.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report prices of coal on Feb. 4, as follows: Best Welsh steam coal, $4.38; seconds, $4.20; thirds, $4.02; dry coals, $3.96; best Monmouthshire, $3.90; seconds, $3.72; best small steam coal, $2.40; seconds, $2.16. All prices are per long ton, f.o.b. shipping port, cash in 30 days less 2½ per cent. discount. There has been a sharp general advance in prices in the last two weeks.

IRON·TRADE·REVIEW

New York, Feb. 15—The iron and steel markets have been rather quieter this week, and the increased buying which marked the latter half of January seems to have subsided. Whether this is a temporary lull only, or whether buyers are still too uncertain about the future to make large commitments, remains to be seen.

In pig iron business has been rather irregular. There have been fewer sales of foundry iron in Eastern territory, but the demand for basic pig seems to be more active. The production of iron is on the increase, as more furnaces are going into blast.

In finished material, there is a demand for bars and wire products. Structural steel is showing more life. Other steel products are quieter than they have been.

The Steel Corporation statement shows unfilled orders on the books on Feb. 1 amounting to 3,110,919 tons. This is an increase of 436,162 tons over Jan. 1.

The gain during January of 436,162 tons in unfilled orders of the U. S. Steel Corporation, as reported Feb. 10, surprised the trade, which was looking for a material increase, but not as large a one as shown. Considering its rate of shipments in the month it would appear that the bookings amounted to about 75 per cent. of capacity, by far the largest for months. A portion of the gain was doubtless due to the entering of rail orders, which had been practically closed last year, and the February gain is not likely to be as large. The tide, however, has clearly turned after a whole year of losses in the total of unfilled orders.

Pig Iron Production—The returns from the blast furnaces, as collected and reported by the *Iron Age*, show that on Feb. 1 there were 206 coke and anthracite furnaces in blast, having an aggregate daily capacity of 59,550 tons of pig iron; an increase of 6200 tons, as compared with Jan. 1. Making allowance for the charcoal furnaces, the total production of pig iron in January is estimated at 1,787,500 long tons; of which 1,128,500 tons were made by furnaces owned and operated by the steel companies.

Baltimore

Feb. 13—Exports for the week included 723,400 lb. steel billets to Glasgow. Imports included 605 tons ferromanganese from Liverpool and 984 tons from Antwerp; 6400 tons iron ore from Cuba.

Birmingham

Feb. 13—The pig-iron market in Southern territory shows little change for the better. Consumers continue to look for lower-priced iron and the manufacturers are not inclined to make any concessions. There is quite a lot of iron being sold in small lots for delivery during the first half of the year at $11 per ton, No. 2 foundry. Much of the lower grades of iron has been sold ahead. As far as can be learned, Southern manufacturers are remaining away from the market yet on iron for delivery during the last half of the year. The make is not being increased any whatever. The sales are a little better than the make so that a slight reduction in the accumulated stocks of iron continues. There is still quite a large amount of iron on the yards in the South.

The steel situation is still active. There is a steady operation of steel plants.

The cast-iron pipe plants are doing fairly well, though the melt in this line has fallen off a little. There is a little demand still on for charcoal iron. The scrap-iron market in the Southern territory is picking up.

Chicago

Feb. 14—The iron market about holds its own, so far as pig-iron sales are concerned, with something of hopefulness apparent in the better tone to the market for finished materials, and both consumers and sellers of pig iron in a waiting mood. General foundry sales, on which chiefly this market depends, are still mostly of the short-time, small-tonnage kind. Melters are buying steadily, but not buying largely, and chiefly for second-quarter needs, with only here and there a venturesome one dipping over into the requirements of the third quarter and last half. There are a good many inquiries, and selling agents prophesy an active movement as soon as buying for the needs that are in sight, along almost all construction lines, shall begin.

Southern coke No. 2 holds to $11 Birmingham, or $15.35 Chicago, on most sales and rumors of lower prices are plentiful but not reliable. Northern iron seems somewhat weaker, with No. 2 at $15.50@16. Sales of finished materials, particularly railroad supplies and structural material, are steadily improving. Coke is quiet at $4.90 for Connellsville.

Cleveland

Feb. 13—There seems to be no interest felt in the ore market, and nothing has been done as to prices.

Pig Iron—Negotiations are on for some round lots of basic, but the parties are far apart on price. Furnaces are putting up quotations as soon as a big order is mentioned. Some good sales of foundry are reported. The market generally is feeling better. Bessemer is $15.90, Cleveland delivery; basic, $14.40; No. 2 foundry, $14.25; Lake Superior charcoal, $17.50 per ton.

Finished Material—Some large orders for plates for shipbuilding are reported, but they will not go to Cleveland mills. Locally, sheets and bars are most active. Bars show special improvement, and cutting prices has about stopped.

Philadelphia

Feb. 15—Eastern Pennsylvania furnaces have profited a great deal by the recently developed activity in pig iron, not only for local delivery, but for several States to the eastward along the Atlantic coast. The only regret expressed by the makers is that the business has been done at very low prices. What adds to their dissatisfaction is that some of the makers in this territory have been dragged into agreements to furnish at the option of the buyers considerable additional material at the present low rates. It can hardly be said that the tone of the market is stronger but there is satisfaction in believing that the tide has turned and that there are reasonable prospects for forward requirements. One decided evidence of coming improvement is the withdrawal on new inquiries of the very low quotations of months past. The past day or two has brought out quite a number of inquiries from near and remote buyers who are known to have very little stock on hand and a good deal of work secured. It is known that a good many offerings have been made of Virginia and Southern irons, and the makers from the South are apparently determined to share in the improving demand. The best quotations for standard No. 2X foundry are $16 for Northern and $15.50 for Southern; gray forge is quoted $14.50@15; basic appears to be on a better foundation at $15, seaboard.

Steel Billets—While steel-billet quotations have not moved up, the undertone of this market is stronger.

Bars—Quite a number of jobbers and retailers are looking after their spring supplies and out of this interest may result some more liberal ordering, though the large idle capacity will not stimulate the anxiety of buyers. Quotations rule very low and on common iron there have been a few orders booked at a further shading.

Sheets—The sheet market is sharing in the improvement in a moderate way. The buying is scattered.

Pipes and Tubes—No developments have been noted and consumers are for the present protected by contracts for delivery which may carry them well into March.

Plates—The orders for plates refer mainly to small requirements so far as local deliveries are concerned. A large State concern has secured an extensive contract for Western delivery.

Structural Material—This week's orders for structural material have been confined to early requirements.

Scrap—All available heavy-steel scrap has been cleaned up, though deliveries will not be made on some of it for a few weeks to come. On this grade of scrap prices have been quoted 50c. higher. For the lighter grades of scrap there is very little call and prices are weak.

Pittsburg

Feb. 14—There has been a further improvement in the general tone of the iron and steel market in the past week, but little, if any, general improvement in bookings of orders. Production by the steel works is steadily increasing, on account of the increased bookings in January. The Cambria Steel Company, which was operating five of its eight blast furnaces late in January, put on a sixth furnace Feb. 4, and a seventh Feb. 13. The Carnegie Steel Company, which was operating about two-thirds of its open-hearth furnaces at Homestead last week, this week is operating the entire 64 furnaces. Prices of finished steel products are firmly held, and in wire products it is regarded as almost certain that there will be another advance, of either $1 or $2 a ton, within the next fortnight, this following the $1 a ton advance which became effective Jan. 23. The advanced prices were held from the start, and accomplished their purpose readily, in bringing heavy specifications upon old contracts. The cut-nail market, however, did not respond to that advance, remaining at $1.60@1.65 per keg.

Pig Iron—The United Steel Company, Canton, Ohio, last Saturday bought 3000 tons of basic iron, 1000 tons for March and 2000 tons for April, from a furnace at Dover, paying $14.50, delivered, equal to $14 at furnace or $13.60, Valley furnaces. In two cases firm bids of $13.50, Valley, have been made for basic iron

without finding sellers, but it is not improbable that this price could be done. The circumstances warrant our raising our last week's quotations 25c., and quoting basic iron at $13.50@13.75, Valley furnaces. Many of the furnaces are quoting $14. As a rule consumers are holding off, doubting whether this sudden accretion of strength on the part of the Valley furnaces can be maintained. We note a sale of 1000 tons of standard bessemer at $15, Valley, the regular quotation, and quote the market unchanged at that figure. A number of small lots of foundry iron have been sold at $14, Valley, although it appears $13.75 can still be done in a few cases, and we continue to quote $13.75 to $14, Valley, noting that the market is slighting firmer than last week. Malleable iron is quotable at $13.75, Valley, or 25c. higher than a fortnight ago.

Ferromanganese—The market continues quiet and quotable at about $38, Baltimore, for prompt or forward.

Steel—The market has grown stronger, there being some inquiries, and in one case an advance of $1 has been paid, on open-hearth sheet bars, a sale of over 2000 tons being made on the basis of $25, Pittsburg. It does not seem to be settled in the market whether the advanced price will prevail, the buyer in this particular instance being in a hurry for the steel, which is now being rolled. We quote former prices, possibly nominal in the case of open-hearth sheet bars, at $23 for billets and $24 for sheet bars, Pittsburg or Youngstown mills. Rods are being regularly quoted at $29, Pittsburg.

Sheets—The sheet mills held a meeting at Pittsburg, Feb. 11, the meeting being much the same character as those of Dec. 8 and Jan. 7. It is stated there were scarcely any reports of shading, and that mill operations were reported as slightly better, mills averaging between 50 and 60 per cent. of capacity. It is not improbable that the mills will continue to meet about once a month. We quote: Black sheets, 2.20c.; galvanized, 3.20c.; blue annealed, 1.65c.; painted corrugated, $1.55; galvanized, $2.75, per square.

St. Louis

Feb. 13—Inquiries for southern iron are very dull. A little business is being placed for third-quarter shipment. All orders and inquiries are for small lots. The price of $11 per ton Birmingham or $14.75 St. Louis remains unchanged. There has been some activity in northern iron.

FOREIGN IRON TRADE

Canadian Production—The total production of rolled iron and steel in Canada in 1909 was 662,741 tons, of which 344,830 tons were steel rails. The total compares with 496,517 tons in 1908 and 600,179 in 1907. The total production of forgings in 1909 was: Iron, 2650; steel, 13,876; total, 16,526 tons; an increase of 1788 tons over 1908. The total make of nails was 37,410,000 lb., an increase of 7,610,000 lb. over 1908.

United States Foreign Trade

Iron and Steel—Exports and imports of iron and steel and of machinery in the United States for the year ended Dec. 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1909.	1910.	Changes.
Exports	$157,674,394	$201,271,903	I.$43,597,509
Imports	30,571,542	47,115,112	I. 16,543,570
Excess, exp.	$127,102,852	$154,156,791	I.$27,053,939

Increase in exports was 27.7 per cent.; in imports, 54.1 per cent. The quantities of the leading articles of iron and steel were, in long tons:

	Exports 1909.	Exports 1910.	Imports 1909.	Imports 1910.
Pig iron	61,989	127,385	176,442	237,233
Scrap	25,360	25,825	63,504	72,764
Billets, blooms, etc.	104,862	58,230	19,288	46,578
Bars	88,031	125,606	19,206	43,692
Rails	299,540	353,180	....	.....
Sheets and plates	135,583	274,516	4,720	6,152
Structural steel	90,830	146,721	.....	.....
Wire-rods	20,142	22,869	10,544	20,374
Wire	149,341	171,928	.....	.....
Nails and spikes	48,055	61,201	.....	.....
Tinplates	9,327	12,549	62,593	66,640
Pipe and fittings	162,185	155,778	.....	.....

Imports of wire not reported in quantities; values were $1,117,812 in 1909, and $1,468,741 in 1910. Imports of rails and structural steel in 1910 were not reported separately.

Iron Ore Movement—Imports and exports of iron ore in the United States, year ended Dec. 31, long tons:

	1909.	1910.	Changes.
Imports	1,694,957	2,591,031	I. 896,074
Exports	455,934	644,875	I. 88,941

The principal items of imports in 1910 were 1,451,096 tons from Cuba; 439,868 from Spain; 259,911 from Sweden; 209,006 from Newfoundland and Labrador; 95,005 tons from Canada.

Manganese Ore—Imports of manganese ore into the United States, year ended Dec. 31, were 212,765 long tons in 1909, and 242,348 in 1910; increase, 29,583 tons.

METAL MARKETS

New York, Feb. 15—The metal markets have been generally quiet, except that the speculation in tin continues, with some sensational variations.

MONTHLY INDEX NUMBERS.

Month.	1910.	1911.	Month.	1910.	1911.
January	127	110	July	112	.....
February	124	.....	August	113	.....
March	118	.....	September	114	.....
April	118	.....	October	111	.....
May	113	.....	November	117	.....
June	107	.....	December	115	.....

Year 1909, 115; 1910, 115.
Numbers for each month and year calculated on approximate sales of pig iron, copper, tin, lead, zinc and aluminum.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Dec. 1910	$1,330,400	$ 4,976,632	Imp.$ 3,646,232
" 1909	10,579,304	2,083,772	Exp. 8,495,532
Year 1910	58,774 822	59,222,518	Imp. 447,696
" 1909	132,880,821	44,086,966	Exp. 88,793,855
Silver:			
Dec. 1910	6,059,348	4,397,410	Exp. 1,661,938
" 1909	5,297,965	4,203,696	" 1,094,269
Year 1910	57,359,261	45,877,128	" 11,482,133
" 1909	57,592,309	46,187,702	" 11,404,607

Exports from the port of New York, week ended Feb. 11: Gold, $30,600; silver, $499,403, chiefly to London. Imports: Gold, $133,272; silver, $88,381, from the West Indies, Mexico and South America.

Gold—The price of gold on the open market in London continued at the normal level, 77s. 9d. per oz. for bars and 76s. 4½d. per oz. for American coin. The Indian government has been in the market for some gold; some was also taken for France and for Argentina.

Platinum—The market is quiet, with prices about the same as they have been for some time. Dealers quote $38.50@39 per oz. for refined platinum, and $41.50@42 for hard metal, 10 per cent. iridium.

SILVER AND STERLING EXCHANGE

Feb.	9	10	11	13	14	15
New York	51 3/8	51 5/8	51 7/8	....	51 7/8	51 5/8
London	23 11/16	23 13/16	23 15/16	23 11/16	23 15/16	23 13/16
Sterling Ex.	4.8615	4.8615	4.8620	....	4.8625	4.8620

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Silver—The market has continued fairly steady at the decline. China seems to be a moderate seller, owing, no doubt, to the continuance of the plague, and the curtailment of produce shipments.

Copper, Tin, Lead and Zinc

NEW YORK

Feb.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. New York, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
9	12½ @12¾	12.25 @12.30	37¾	4.40 @4.50	4.25 @4.30	5.42½ @5.47½	5.27½ @5 32½
10	12½ @12¾	12.25 @12.30	39½	4.40 @4.50	4.25 @4.30	5 45 @5.50	5.30 @5.35
11	12½ @12¾	12.25 @12.30	39¾	4.40 @4.50	4.25 @4.30	5 45 @5.50	5.30 @5.35
13	.....	.....	....	.....	4.25 @4.30	.....	5.35 @5.37½
14	12½ @12¾	12.25 @12.30	42¾	4.40 @4 50	4.25 @4.27½	5 50 @5.55	5.35 @5.40
15	12½ @12¾	12.25 @12 30	43¾	4.40 @4.50	4.25 @4.27½	5 50 @5.55	5.35 @5.40

The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Feb.	Copper. Spot.	Copper. 3 Mos	Copper. Best Sel'td	Tin. Spot.	Tin. 3 Mos	Lead, Spanish.	Zinc, Ordinaries.
9	54⅛	55 1/16	58¼	171⅛	171½	13⅛	23⅝
10	55	55¾	58¾	178½	178	13 1/16	23⅝
11	.....	.....	.....	.....	.....	.....	.....
13	55⅛	55⅞	59¼	190	189½	13	23¾
14	55	55 [illegible]	59	194½	192½	12 15/16	23¼
15	54⅞	55 [illegible]	59	197	193	12 15/16	23¼

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £12 = 2.61c.; £23=5c.; £60 = 13.04c. ± £1 = ± 0.21¾c.

Copper—The trade generally did not regard the statistics for January unfavorably. It recognized that the deliveries were below the consumption, and it is the current opinion that the consumption of copper is as large, if not larger, than the production. The market has been steady and a fair business has been doing from day to day, both for home trade and for export, and it is noteworthy that the orders for export have in a large part been for early shipment. All sellers have been offering electrolytic at 12½c., delivered, usual terms, but in order to consummate business many of them have been willing to make concessions of a few points. In the latter part of the week there was perhaps a little stiffening in attitude and less willingness to make concessions. The above terms have prevailed for contracts as far ahead as May. The business in Lake copper has been devoid of any particular features. The market closes unchanged, with Lake copper at 12½@12¾c, and electrolytic copper at 12.25@12.30c. Casting copper is quoted nominally at 12@12⅛ cents.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 13½c. base, carload lots at mill.

The London market for standard copper has been firm. On February 13 it advanced to £55 2s. 6d. for spot and £55 17s. 6d. for three months, and it closes somewhat lower at £54 17s. 6d. for spot and £55 11s. 3d. for three months.

Messrs. Henry R. Merton & Co. estimate stocks of copper at Hamburg and Rotterdam on Feb. 1 at 22,600 long tons; an increase of 100 tons over the Jan. 15 report.

Copper exports from New York for the week were 505 long tons. Our special correspondent gives the exports from Baltimore for the week at 1948 tons.

L. Vogelstein sailed for Europe on February 8.

Tin—On Feb. 9, the market, under very large transactions which in London amounted to 2350 tons, declined over £10 per ton, touching £171 10s. for both spot and three months, thereby reaching its lowest point on this movement. This severe break was ascribed to liquidation of continental bull accounts and to renewed selling by members of the syndicate. On Feb. 11 the tone of the market changed completely. Liquidation had seemingly run its course, and the syndicate once more assumed control of the market. The tendency became strong and the metal again advanced by leaps and bounds, closing today very strong at £197 for spot and £193 for three months.

The lower prices of last week attracted a good deal of buying in this market. When the tone of the London market became firmer again, it was impossible for consumers to obtain tin at the London parity, and an especially heavy premium is again being exacted for spot and February material. The New York market closes at about 45 for February and 43.75 for later deliveries.

Lead—The market is quiet and somewhat easier, Missouri lead being quoted at 4.25@4.27½c., and New York lead at 4.40@4.50c. The A. S. and R. Co.'s price for desilverized remained at 4.50 cents. The London market for Spanish lead is also slightly easier, and closes at £12 18s. 9d. and at £13 1s. 3d. for English lead.

Spelter—There has been a good demand from galvanizers and a somewhat better demand from brass manufacturers, and business is reported at advancing prices, some round tonnages having been placed. At the close St. Louis is quoted at 5.35@5.40c., and New York at 5.50@5.55 cents.

The London market for good ordinaries closes at £23 5s., with £23 10s. for specials.

Base price of zinc sheets is $7.50 per 100 lb., f.o.b. La Salle-Peru, Ind., less 8 per cent. discount.

Other Metals

Aluminum—The market is looking up a little, and there have been more sales than for several weeks. We continue to quote 21@21½c. for No. 1 ingots in large lots, New York.

In New York, Feb. 10, a lot of ingots, guaranteed 98 to 99 per cent., weighing 20,055 lb., was sold at public auction, bringing 20.32½c. per lb., cash on delivery. The metal was imported from Italy, and is said to have been sold on account of failure of buyers to carry out contract.

Antimony—Business is about the same and prices show no change. Quotations are 8¼c. per lb. for Cookson's, 7¾c. for U. S. and 7¼@7⅜c. for Hungarian and other brands.

Quicksilver—Business is good at the recent advance. The New York quotation is $46@47 per flask of 75 lb. for large lots; $49@50 for jobbing lots. San Francisco, $46 for domestic orders and $2 less for export. The London price is £8 10s. per flask, with £8 7s. 6d. quoted by second hands.

Bismuth—The current price of bismuth in London is 7s. 6d.—or $1.80—per lb. This price has been maintained for several months.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Zinc and Lead Ore Markets

Platteville, Wis., Feb. 11—The highest price paid this week for zinc ore was $41.50; the base price was $41 per ton of 60 per cent. zinc. The base price paid for lead ore, 80 per cent., was $53@54 per ton.

SHIPMENTS, WEEK ENDED FEB. 11.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	815,600	66,000	376,200
Mineral Point	799,600	.....	.....
Galena	633,700	.....	.....
Harker	136,540	.....	.....
Benton	88,000	.....	.....
Shullsburg	85,400	.....	.....
Cuba City	69,370	.....	304,630
Linden	.....	50,000	60,000
Total	2,628,210	116,000	740,830
Year to date	16,807,530	1,164,025	5,599,930

Shipped during week to separating plants, 2,141,495 lb. zinc ore.

Joplin, Mo., Feb. 11—The highest price paid for zinc sulphide ore was $45 per ton, the assay base ranging from $36 to $41.50 per ton of 60 per cent. zinc. Scale base, $39.23. Zinc silicate ore sold at $20@23 per ton of 40 per cent. zinc. The shipment of zinc ore continues moderate, a little less than the output each week. At Miami, alone, upward of 2000 tons remain in the bins unsold, being held for a higher market. Miami producers make expenses from the lead output, and a 50c. or $1 advance in zinc brings them a neat piece of added profit when a big bin of ore is sold. Average price, all grades zinc, $38.54. Lead prices were generally a little stronger, though the high price

SHIPMENTS, WEEK ENDED FEB. 11.

	Zinc lb.	Lead lb.	Value.
Webb City-Carterville	4,235,070	906,070	$107,952
Joplin	2,060,290	396,250	51,796
Alba-Neck	1,096,750	.....	24,128
Jackson	179,570	600,260	20,307
Galena	558,560	127,450	14,116
Duenweg	294,540	75,810	7,477
Spring City	164,500	148,460	6,407
Miami	73,420	188,490	6,136
Granby	421,270	5,000	6,065
Oronogo	138,840	62,690	4,223
Carthage	148,950	.....	2,979
Aurora	183,730	.....	2,918
Badger	65,640	4,320	1,428
Cave Springs	69,760	.....	1,290
Greenfield	42,070	.....	378
Totals	9,732,960	2,514,800	$257,600
6 weeks	54,581,550	9,501,570	$1,346,579
Zinc value, the week,	$187,585;	6 weeks,	$1,082,268
Lead value, the week,	70,015;	6 weeks,	264,311

did not exceed that of last week, $58. The average price, all grades of lead, $55.68 per ton.

The lead shipment was the largest this year, a portion of which is not included in the report, as settlement was not reached upon it.

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	$47.31	$41.85	$45.16	$40.55	$56.99	$55.68
February	40.69	.....	39.47	.....	53.64	.....
March	43.60	.....	39.71	.....	51.26	.....
April	41.00	.....	39.33	.....	49.72	.....
May	40.19	.....	37.51	.....	48.16	.....
June	40.20	.....	37.83	.....	48.80	.....
July	39.63	.....	36.80	.....	48.59	.....
August	40.13	.....	37.32	.....	49.75	.....
September	43.45	.....	39.96	.....	54.73	.....
October	43.31	.....	40.50	.....	53.18	.....
November	47.20	.....	43.20	.....	54.80	.....
December	42.50	.....	40.70	.....	55.70	.....
Year	$42.43	.....	$39.79	.....	$52.12	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

CHEMICALS

New York, Feb. 15—General business remains rather quiet, and there is not much doing outside of contract deliveries.

Copper Sulphate—Business is on a fair scale, with prices unchanged at $4 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller parcels.

Arsenic—The market is dull and we continue to quote about $2 per 100 lb. for white arsenic.

Nitrate of Soda—Sales are looking up a little, but prices are unchanged at 2.10c. per lb. for both spot and futures.

Potash Salts—Exports of potash salts from Germany, year ended Dec. 31, metric tons:

	1909.	1910.	Changes.
Kainit, etc	946,457	1,181,208	I. 234,751
Potassium chloride	216,286	266,783	I. 50,497
Potassium sulphate	63,065	76,206	I. 13,141
Pot.-magnesium sul.	138,328	197,408	I. 59,080
Total	1,364,136	1,721,605	I. 357,469

The largest increase was in kainit, kieserit and other crude salts. Exports to the United States, included above, were 1,029,324 tons in 1910; an increase of 328,754 tons over the previous year.

Petroleum

An unusual case is the arrival at Philadelphia this week of the tank steamer "Lumen" from Kustendje on the Black Sea, with a cargo of 2000 tons of Rumanian petroleum. The oil is for sale in this country. This is said to be an incident in the fight between the Standard Oil and its European rivals; the latter having started to invade Standard territory.

MINING·STOCKS $

New York, Feb. 15—Moderate trading, chiefly professional, and a general tendency of stocks to advance cover the conditions of the market. The advances have been rather irregular.

One sale of Homestake is reported today, at $85.25 per share.

On the Curb, the copper stocks were fairly steady in price, but dealings were only moderate. A stock not heretofore dealt in—Delaware, Lackawanna & Western Coal Company—made its appearance on the Curb during the week, sales being made at $315@330 per share.

An account of the plans to organize the Curb market appears on another page.

At auction in New York, Feb. 9, Nevada Smelting and Mines Corporation brought 7c. per share for 1200 shares and 8c. per share for 1300 shares; 1650 shares Discovery Gold Mining Company of British Columbia, $5 par, $25 for the lot. A lot consisting of 2625 shares Bullion Mountain Copper Company, $5 par; 34 shares Buffalo Hump Mining Company, $10 par; 334 shares Carbonate Hill Mining Company, $10 par; 500 shares Julian Gold Mining Company, $10 par; 150 shares Santa Rita Land and Mining Company, $25 par, with some industrials, brought $7 for the lot.

Boston, Feb. 14—There is little interest in copper shares, although the feeling is growing that they are in a position to do better when the proper time arrives. Offerings of stocks are scarce, while there is a disposition on the part of the public to sit up and take notice.

The firmer tone of Amalgamated Copper has served to impart a better tone to the general copper-share list. This has been noticeable in North Butte, East Butte, Hancock, Butte Coalition, Calumet & Arizona and a few others; but the market has neither been broad nor active in any of them.

The market for the so called Calumet & Hecla subsidiary stocks is almost void. Occasionally an odd lot of Isle Royale, Superior, Osceola, Tamarack or La Salle appears on the market, but at slightly changed prices. Calumet & Hecla stock is firmer at $523.

There is now some question whether the merger plan will go through. Besides the Osceola opposition in the Lake Superior district, other and stronger interests in the Ahmeek have brought formidable objections. These latter, headed by T. L. Chadbourne, of Houghton, Mich.—who, by the way, is an ex-counsel for the Calumet company—have brought a broadside against the merger, which looks like the entering wedge for blocking the scheme.

Business on the Curb has been restricted, although there are seen signs of a revival of life. Amalgamated Nevada furnished a sensational rise from 12 to 25c. on very heavy trading.

Salt Lake City, Feb. 5—The governing board of the Salt Lake Stock and Mining Exchange for the coming year was elect-

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

Company.	November.	December.	January.
Anaconda	21,900,000	21,500,000	21,000,000
Arizona, Ltd	3,010,000	3,224,000	3,024,000
Balaklala	.....	160,000	.....
Copper Queen	7,372,776	.....	7,298,227
Calumet & Ariz	1,930,000	1,900,000	.....
Detroit	1,840,939	.....	2,017,397
East Butte	618,191	870,812	1,134,000
Imperial	*nil*	.....	.....
Mammoth	.....	.....	.....
Nevada Con	5,207,353	5,510,936	.....
Old Dominion	2,754,000	2,287,000	2,095,000
Shannon	1,420,000	.....	1,250,000
Superior & Pitts	2,160,000	2,175,000	.....
United Verde*	3,000,000	.....	3,000,000
Utah Copper Co	7,468,515	7,137,585	.....
Lake Superior*	20,400,000	20,000,000	.....
Non-rep. mines*	13,200,000	13,100,000	.....
Total production.	92,281,775	.....	.....
Imports, bars, etc.	24,835,954	25,192,854	.....
Total blister	117,117,629	.....	.....
Imp. in ore & matte	5,542,279	9,316,091	.....
Total	122,660,608	.....	.....
Brit. Col. Cos.:			
British Col. Copper	917,994	.....	.....
Granby	1,410,261	1,645,613	.....
Mexican Cos.:			
Boleo	.....	2,766,630	2,647,173
Cananea	3,658,000	.....	.....
Moctezuma	1,654,235	.....	1,738,429

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners.
*Estimated.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
I, 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518
III	120,067,467	62,344,818	40,585,767
IV	117,477,639	67,985,951	31,332,434
V	123,242,476	59,305,222	45,495,400
VI	127,219,188	53,363,196	65,895,948
VII	118,370,003	56,708,175	59,407,167
VIII	127,803,618	67,731,271	61,831,780
IX	119,519,983	64,501,018	75,106,496
X	126,469,284	67,814,172	68,186,912
XI	119,353,463	60,801,992	67,424,316
XII	123,339,219	43,594,018	88,104,075
Year 1910	1,452,122,120	749,426,542	722,431,494
I, 1911	115,696,591	42,078,567	53,208,739

	Visible Stocks. United States.	Europe.	Total.
II, 1910	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474
V	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373
VII	168,386,017	232,892,800	401,278,818
VIII	170,640,678	222,320,000	392,960,677
IX	168,881,245	218,444,800	387,326,045
X	148,793,714	211,276,800	360,070,514
XI	139,261,914	198,060,800	337,322,714
XII	130,389,069	193,200,000	323,589,069
I, 1911	122,030,195	187,797,120	309,827,315
II	142,439,490	186,368,000	328,807,490

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

ed at a meeting held Jan. 28, as follows: W. D. Nebeker, W. H. Child, F. C. Dern, A. L. Jacobs, W. J. Browning, R. S. Wimmer, R. J. Evans, E. G. Woolley, Jr., and W. H. Tibbals. W. J. Browning was chosen president by the board, to succeed James A. Pollock, who will be out of the city much of the time. The vice-presidents are: W. D. Nebeker, W. H. Child and E. G. Wooley, Jr. G. P. Norton was elected treasurer and J. A. Shorten, secretary. George F. Wasson, who has served the Exchange as caller for the past year will continue in that capacity. The financial statement showed receipts for 1910 to have been $23,394. The assets are $160,401, with bonds outstanding amounting to $67,000, leaving $93,401 surplus.

Assessments

Company.	Delinq.	Sale.	Amt.
Advance, Mont.	Feb. 1	Mar. 1	$0.003
Aeolian, Ida.	Mar. 1	Mar. 18	0.005
Albion, Utah.	Feb. 23	Mar. 27	0.13
Beck Tunnel, Utah.	Jan. 10	.....	0.01
Capital, Ida.	Feb. 10	Mar. 10	0.002½
Con. Virginia, Nev.	Feb. 7	Feb. 28	0.25
Crown Point, Nev.	Jan. 30	Feb. 23	0.10
East Crown Point, Utah.	Feb. 10	.....	0.00½
East Vallejo, Utah.	.....	.....	0.00½
Eureka M. & M, Ida.	Jan. 23	Feb. 21	0.000½
Florence M. & M., Ida.	Feb. 20	Mar. 22	0.001
Franklin, Mich.	Feb. 6	.....	2.00
Great Eastern, Ida	Feb. 9	Mar. 9	0.003
Hancock Con., Mich.	Mar. 1	.....	1.00
Helvetia Copper, Ariz.	Feb. 15	.....	0.50
Idaho-Nevada Expl, Ida.	Jan. 23	Feb. 23	0.000½
Independence, Utah.	Mar. 9	Mar. 25	0.007
Julia Con., Nev.	Jan. 15	Feb. 16	0.03
Lower Mammoth, Utah.	Feb. 11	.....	0.05
Lucky Swede, Ida.	Apr. 1	May 1	0.002
Reindeer Cop. & Gold, Ida.	Feb. 1	Feb. 25	0.005
Pandora, Ida.	Jan. 30	Feb. 28	0.003
Selma, Utah.	Feb. 15	Mar. 15	0.00½
Super'r & Boston Cop., Ariz.	Feb. 20	.....	1.00
Teddy M. & M., Ida.	Jan. 20	Feb. 20	0.002
Tonopah North Star, Nev.	.....	.....	0.03
Treasure, Cal.	Feb. 10	Mar. 3	0.05

Monthly Average Prices of Metals

SILVER

Month.	New York.			London.		
	1909.	1910.	1911.	1909.	1910.	1911.
January	51.750	52.375	53.795	23.843	24.154	24.865
February	51.472	51.534	.....	23.706	23.794	.....
March	50.468	51.454	.....	23.227	23.690	.....
April	51.428	53.221	.....	23.708	24.483	.....
May	52.905	53.870	.....	24.343	24.797	.....
June	52.538	53.462	.....	24.166	24.651	.....
July	51.043	54.150	.....	23.519	25.034	.....
August	51.125	52.912	.....	23.588	24.428	.....
September	51.440	53.295	.....	23.743	24.567	.....
October	50.923	55.490	.....	23.502	25.596	.....
November	50.703	55.635	.....	23.351	25.680	.....
December	52.226	54.428	.....	24.030	25.160	.....
Total	51.502	53.486	.....	23.706	24.670	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	New York.				London, Standard.	
	Electrolytic		Lake.			
	1910.	1911.	1910.	1911.	1910.	1911.
January	13.620	12.295	13.870	12.680	60.92s	55.60d
February	13.332	.....	13.719	.....	59.38s	.....
March	13.255	.....	13.586	.....	59.21d	.....
April	12.733	.....	13.091	.....	57.23s	.....
May	12.550	.....	12.885	.....	56.31s	.....
June	12.404	.....	12.798	.....	55.31s	.....
July	12.215	.....	12.570	.....	54.19d	.....
August	12.490	.....	12.715	.....	55.73s	.....
September	12.379	.....	12.668	.....	55.20s	.....
October	12.553	.....	12.788	.....	56.72s	.....
November	12.742	.....	12.914	.....	57.63d	.....
December	12.581	.....	12.863	.....	56.76s	.....
Year	12.738	.....	13.039	.....	57.05d	.....

TIN AT NEW YORK

Month.	1910.	1911.	Month.	1910.	1911.
January	32.700	41.255	July	32.695	.....
February	32.920	.....	August	33.972	.....
March	32.403	.....	September	34.982	.....
April	32.976	.....	October	36.190	.....
May	33.125	.....	November	36.547	.....
June	32.769	.....	December	38.199	.....
			Av. Year	34.123	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	4.700	4.483	4.582	4.334	13.650	13.069
February	4.613	.....	4.445	.....	13.328	.....
March	4.459	.....	4.307	.....	13.063	.....
April	4.376	.....	4.225	.....	12.641	.....
May	4.315	.....	4.164	.....	12.550	.....
June	4.343	.....	4.207	.....	12.688	.....
July	4.404	.....	4.291	.....	12.531	.....
August	4.400	.....	4.296	.....	12.513	.....
September	4.400	.....	4.289	.....	12.582	.....
October	4.400	.....	4.271	.....	13.091	.....
November	4.442	.....	4.314	.....	13.217	.....
December	4.500	.....	4.363	.....	13.197	.....
Year	4.446	.....	4.312	.....	12.920	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	6.101	5.452	5.951	5.302	23.350	23.887
February	5.569	.....	5.419	.....	23.188	.....
March	5.637	.....	5.487	.....	23.031	.....
April	5.439	.....	5.289	.....	22.469	.....
May	5.191	.....	5.041	.....	22.100	.....
June	5.128	.....	4.978	.....	22.094	.....
July	5.152	.....	5.002	.....	22.406	.....
August	5.279	.....	5.129	.....	22.806	.....
September	5.514	.....	5.364	.....	23.165	.....
October	5.628	.....	5.478	.....	23.900	.....
November	5.976	.....	5.826	.....	24.083	.....
December	5.624	.....	5.474	.....	24.019	.....
Year	5.520	.....	5.370	.....	23.050	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	$19.90	$15.90	$17.98	$14.40	$17.94	$14.75
February	18.96	.....	17.21	.....	17.38	.....
March	18.53	.....	16.93	.....	17.00	.....
April	18.28	.....	16.84	.....	16.75	.....
May	17.10	.....	15.94	.....	16.18	.....
June	16.52	.....	15.60	.....	15.53	.....
July	16.40	.....	15.40	.....	15.40	.....
August	16.09	.....	14.89	.....	15.16	.....
September	15.92	.....	14.73	.....	14.93	.....
October	15.90	.....	14.65	.....	14.88	.....
November	15.84	.....	14.26	.....	14.78	.....
December	15.90	.....	14.15	.....	14.65	.....
Year	$17.10	.....	$15.65	.....	$15.83	.....

STOCK QUOTATIONS

COLO. SPRINGS Feb. 14

Name of Comp.	Bid.
Acacia	.04
Cripple Cr'k Con.	.02
C. K. & N.	.15
Doctor Jack Pot.	.07½
Elkton Con.	.71½
El Paso	.73½
Findlay	.05
Gold Dollar	.12½
Gold Sovereign	.02½
Isabella	.17½
Jack Pot	.07
Jennie Semple	.10
Lexington	.01¼
Moon Anchor	.03
Old Gold	.03½
Mary McKinney	.46½
Pharmacist	.02½
Portland	1.01
Vindicator	.88½
Work	.03½

SALT LAKE Feb. 14

Name of Comp.	Bid.
Beck Tunnel	.26½
Bingham Copper	‡.15
Black Jack	.12
Carisa	.15
Colorado Mining	.44
Columbus Con.	.10
Daly Judge	‡4.45
Grand Central	.73
Iron Blossom	1.10
Little Bell	.50
Lower Mammoth	.11½
Mason Valley	8.75
Maj. Mines	‡.53
May Day	.09½
Nevada Hills	2.37½
New York	‡.13
Prince Con	.66
Silver King Coal'n	1.85
Sioux Con	.39
Uncle Sam	.66

SAN FRANCISCO Feb. 14.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Alta	‡.05
Belcher	‡.73
Best & Belcher	.40
Caledonia	.32
Challenge Con.	.12
Chollar	.15
Confidence	‡.45
Con. Virginia	1.27½
Crown Point	‡.73
Gould & Curry	.19
Hale & Norcross	.25
Mexican	1.70
Occidental	.40
Ophir	1.27½
Overman	.31
Potosi	.25
Savage	.17
Sierra Nevada	.33
Union Con.	.66
Yellow Jacket	.36

Name of Comp.	Bid.
MISC. NEV. & CAL.	
Belmont	5.85
Jim Butler	.28
MacNamara	.16
Midway	.13
Mont.-Tonopah	.90
North Star	.04
West End Con.	.51
Atlanta	.13
Booth	.05
C.O.D. Con.	.09
Comb. Frac.	.11
Jumbo Extension	.25
Oro	.03
Silver Pick	.05
St. Ives	‡.05
Tramps Con.	.03
Argonaut	‡1.35
Bunker Hill	‡7.25
Cent. Eureka	‡1.25
So. Eureka	‡6.50

N. Y. EXCH. Feb. 14

Name of Comp.	Clg.
Amalgamated	65½
Am. Agri. Chem.	51
Am.Sm.&Ref.,com	79⅝
Am. Sm. & Ref., pf.	105⅝
Anaconda	40⅛
Batopilas Min.	‡2¼
BethlehemSteel pf	64
Federal M. & S.,pf.	63
Goldfield Con.	6¾
Great Nor.,orectf.	63
Homestake	85¼
Nat'nalLead,com.	57½
National Lead, pf.	‡108¼
Nev. Consol.	19¼
Pittsburg Coal,pf.	‡72½
RepublicI&S,com.	35
Republic I & S, pf.	99
SlossSheffi'd,com.	‡55
Sloss Sheffield, pf.	112
Tennessee Copper	38½
Utah Copper	46⅛
U. S. Steel, com.	81⅛
U. S. Steel, pf.	119
Va. Car. Chem.	65¼

BOSTON EXCH. Feb. 14

Name of Comp.	Clg.
Adventure	‡5¼
Algomah	8⅛
Allouez	‡35
Am. Zinc	24½
Arcadian	‡3½
Arizona Com	15½
Atlantic	4
Bonanza	‡.50
Boston & Corbin	‡13
Butte & Balak	‡5⅝
Calumet & Ariz.	53½
Calumet & Hecla	515
Centennial	12¼
Con. Mercur	‡.06
Copper Range	67¾
Daly-West	‡3
East Butte	12⅞
Franklin	10
Granby	34½
Hancock	20½
Helvetia	1¾
Indiana	13⅞
Isle Royale	‡14
Keweenaw	2¼
Lake	37
La Salle	4½
Mass	7¼
Michigan	3
Mohawk	42
New Arcadian	‡3
North Butte	29
North Lake	‡7
Ojibway	7
Old Dominion	40
Osceola	110
Parrot	12½
Quincy	67
Shannon	11¼
Shattuck-Ariz	‡21¾
Superior	‡38
Superior & Bost.	4¾
Superior & Pitts.	14⅞
Tamarack	‡45
Trinity	‡14¼
U. S. Smelting	36½
U. S. Smelt'g, pf.	47
Utah Apex	‡2¾
Utah Con.	‡12¼
Victoria	‡2¼
Winona	9
Wolverine	‡120
Wyandot	‡1¼

N. Y. CURB Feb. 14

Name of Comp.	Clg.
Ariz.-Cananea	‡33⅛
Barnes King	‡⅛
Braden Copper	31⅝
B. C. Copper	6½
Buffalo Mines	‡2.27½
Butte Coalition	19
Caledonia	‡1⅛
Calumet & Mont.	.10
Chino	22
Cobalt Central	.09½
Con. Ariz. Sm.	1⅝
Davis-Daly	1⅜
Ely Con	.33
El Rayo	‡2½
Florence	1⅝
Giroux	6⅛
Greene Cananea	6¼
Greenwater	.05⅛
Guanajuato	3⅝
Guerrero	‡1⅛
Guggen. Exp.	218
Inspiration	8⅛
Internat. S. & R.	‡131
Kerr Lake	7⅛
La Rose	5
McKinley-Dar-Sa.	1⅝
Miami Copper	20¼
Mines Co. of Am.	5
Mont. Shoshone	.10
Nev. Utah M. & S.	1⅛
Nipissing Mines	11
Ohio Copper	1⅛
Pacific Sm. & M.	1/16
Precious Metals	1¼
Ray Central	1⅛
Ray Con	17½
Red Warrior	1½
South Utah M.& S.	⅞
Standard Oil	635
Stewart	11/16
Tonopah	8 3/16
Tonopah Ex.	1.03
Tri-Bullion	1/16
Tularosa	2/16
Union Mines	5/16
Yukon Gold	4

BOSTON CURB Feb. 14

Name of Comp.	Last.
Ahmeek	170
Bingham Mines	2.50
Boston Ely	.95
Boswyocolo	‡.08
Cactus	‡.20
Calaveras	2
Champion	.02
Chief Cons	1.50
Cons. Ariz.	1½
Corbin	3⅛
Cortez	‡2.12½
Crown Reserve	2.75
First Nat. Cop.	1.75
Live Oak	19½
Mackinaw	.09
Majestic	.37
Nat'l Mine & Ex.	‡.03
Nevada-Douglas	2⅛
Oneco	‡1.87½
Raven Copper	.35
Rhode Island Coal	5.25
San Antonio	‡5
South Lake	6.00
Trethewey	‡1⅛
Tuolumne Copper	4¼
United Zinc, pfd.	5
Vulture	.07½
Yuma	‡.24

LONDON Feb. 15

Name of Com.	Clg.
Camp Bird	£1 14s 7½d
Dolores	1 10 0
El Oro	1 5 7½
Esperanza	1 12 6
Mexico Mines	7 8 9
Oroville	0 7 6
Stratton'sInd.	0 2 3
Tomboy	0 15 6

‡Last quotation.